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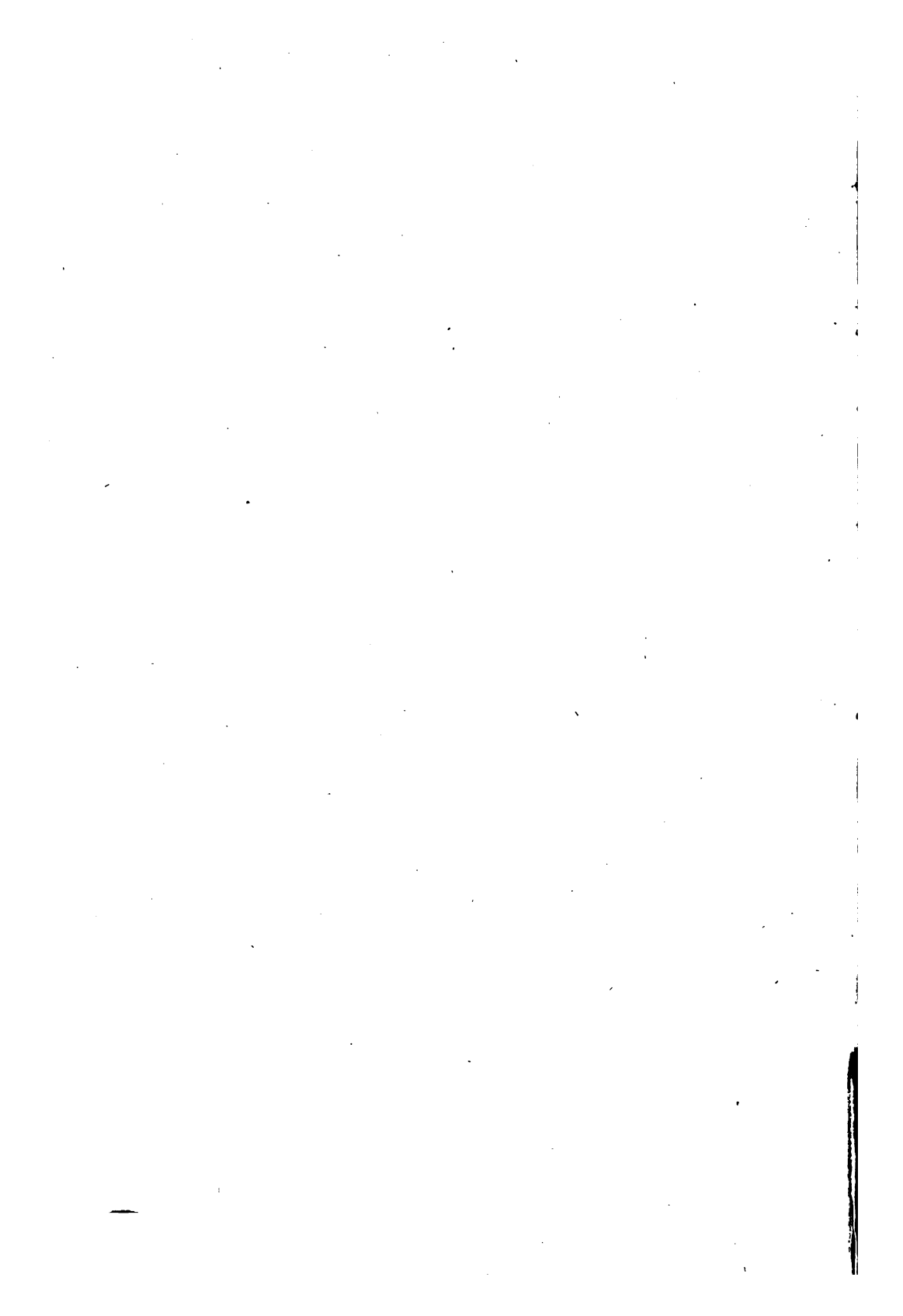
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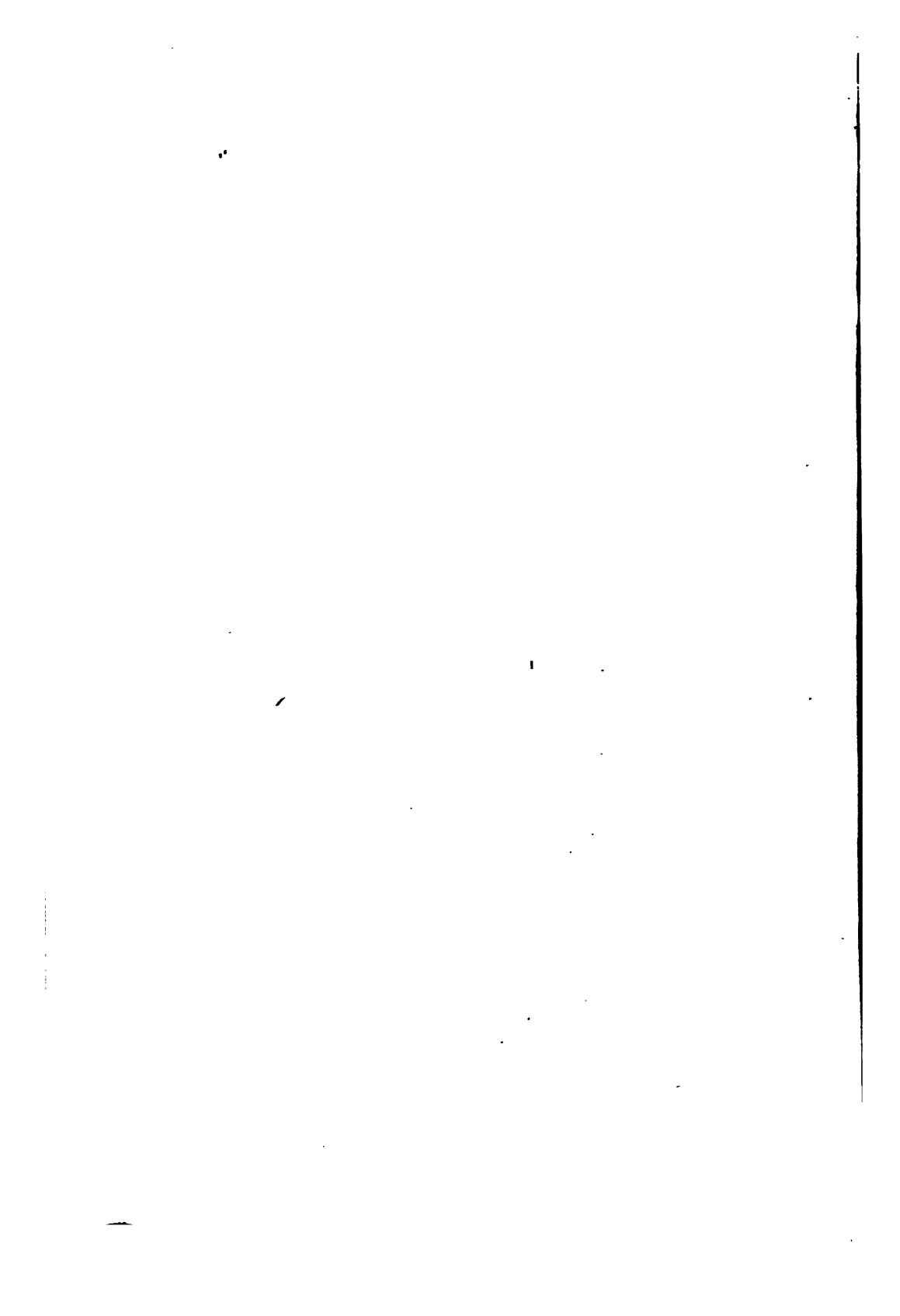
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DIRECTORY
TO THE
IRON AND STEEL WORKS
OF THE
UNITED STATES.

EMBRACING THE
BLAST FURNACES, ROLLING MILLS, STEEL WORKS,
FORGES, AND BLOOMARIES IN EVERY
STATE AND TERRITORY.

PREPARED AND PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

CORRECTED TO SEPTEMBER 1, 1884.

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PREFACE.

WE present herewith to the members and correspondents of The American Iron and Steel Association the seventh edition of our Directory to the Iron and Steel Works of the United States. This edition has been thoroughly revised to the 1st of September of the present year, and, as in previous editions, no pains have been spared to make it both full and accurate. All the old features have been retained, and new features have been added.

On a succeeding page will be found a complete summary of the number and capacity of the iron and steel works which are described in this edition of the Directory, compared with the summary which accompanied the sixth edition of the Directory, which was corrected to July 25, 1882.

There was a decrease of 11 in the number of furnaces in the United States between July, 1882, and September, 1884, or from 686 to 675. Between these dates many new furnaces were built, principally furnaces of large capacity, but a large number of old and badly-located furnaces were definitely abandoned, a few were burned down and will not be rebuilt, and a few were torn down to be rebuilt. The total number abandoned, burned down, and torn down was 38. The number of new furnaces built was 27.

The 675 blast furnaces which were completed on the 1st of September last were classified according to fuel as follows: 221 bituminous coal and coke, 221 anthracite, 232 charcoal, and one gas. The 686 completed furnaces on July 25, 1882, were classified as follows: 210 bituminous, 225 anthracite, 250 charcoal, and one gas. These figures show an increase of 11 bituminous furnaces, a decrease of 4 anthracite furnaces, and a decrease of 18 charcoal furnaces.

While there were eleven more furnaces on July 25, 1882, than on the 1st of September last, the nominal capacity of all the furnaces, using the figures given to us by manufacturers, had increased from 8,000,000 net tons in 1882 to 9,300,000 net tons in 1884. We use the word "nominal" in qualifying the capacity of furnaces because it is important to remember that the aggregate figures for both the years 1882 and 1884 represent the highest possible production by all the furnaces if they were all in operation at the same time and each furnace was running under the most favorable circumstances—conditions which are, of course, impossible. What the actual capacity of our furnaces may be under an urgent demand with high prices is probably 25 per cent. less than the nominal estimate given above, or 6,975,000 net tons, instead of 9,300,000 net tons; that is, 6,227,678 English tons, instead of 8,303,571 English tons.

tons. There are many reasons why the highest estimated capacity can not be attained, only one of which we will mention.

Many of the furnaces retained in our list in 1882 and 1884, the capacity of which helps to form the aggregates for those years, have been out of blast for several years, and being unfavorably situated and of antiquated construction will probably never be put in blast. We do not positively *know* what their future will be, and hence do not feel authorized to place them in our abandoned list. This Directory tells *where furnaces are located*, but it does not assume to point out those which can not hereafter make pig iron at a profit, and hence have no more right to be counted as existing furnaces than if they had not been built. We use due diligence in ascertaining what furnaces have actually been abandoned, but we can not class as abandoned a furnace which the owner tells us he *has not abandoned*. It is, however, our deliberate judgment that the whole number of furnaces in this country to-day which are in blast or will ever be put in blast does not exceed 600, instead of the 675 of which this Directory furnishes a description.

The number of rolling mills and steel works in the United States has increased from 400 in July, 1882, to 434 in September, 1884. Between these dates 45 new works of the character described were built, but in the same period 11 rolling mills and steel works were abandoned, leaving a net increase of 34. Most of the new works were built to make nails and spikes. In the period mentioned the number of nail machines increased from 4,030 to 5,695. This is a great increase in nail-making capacity. It is noticeable that some of the new rolling mills are located in sections of the country that have not heretofore given much attention to the manufacture of iron in any form. Minnesota, Iowa, and Texas have each built a rolling mill for the production of bar iron since 1882. These are the first rolling mills in their history. Before another edition of this Directory appears many rolling mills that have until recently been engaged in rolling iron rails must be converted into mills for rolling iron in other forms, or else must be abandoned.

Since July, 1882, the number of Bessemer steel works in the country has increased from 15 to 21, with one additional works in course of erection at the present time. The number of converters has increased from 36 in July, 1882, to 46 in September, 1884. The number of completed open-hearth steel works has increased in the same period from 27 to 35, with 3 new works now in course of erection. We had 51 open-hearth furnaces in July, 1882, and 58 in September, 1884. Our crucible steel works have increased from 35 to 41 in the same period, and the number of steel-melting pots from 3,490 to 3,594.

Further details in the summary will be found to be interesting, but need not be referred to here.

PHILADELPHIA, September 1, 1884.

SUMMARY.

IRON AND STEEL WORKS.	September 1, 1884.	July 25, 1882.
Number of completed Blast Furnaces, ...	675	686
Number of Blast Furnaces building on September 1, 1884,—10 Bituminous, 2 Anthracite, and 4 Charcoal; total, ...	16	30
Annual capacity of completed Blast Furnaces, in pig iron, net tons, ...	9,300,000	8,000,000
Annual capacity of the Bituminous Furnaces, net tons, ...	4,850,000	4,125,000
Annual capacity of the Anthracite Furnaces, net tons, ...	3,175,000	2,750,000
Annual capacity of the Charcoal Furnaces, net tons, ...	1,275,000	1,125,000
Number of completed Rolling Mills and Steel Works, ...	434	400
Number of Rolling Mills and Steel Works building, ...	4	16
Number of Rolling Mills making rails, ...	71	80
Number of Single Puddling Furnaces (a double furnace count- ing as two single ones), ...	5,265	5,018
Number of Heating Furnaces, ...	2,782	2,598
Number of Trains of Rolls, ...	1,555	1,424
Annual capacity of Rolling Mills in finished iron and steel, net tons, ...	7,600,000	7,000,000
Number of Rolling Mills having Nail Factories, ...	81	66
Number of Nail Machines, ...	5,695	4,080
Number of Nail Factories building, ...	2	2
Number of Nail Machines to be used in the new Factories, . .	67	158
Number of completed Bessemer Steel Works, ...	21	15
Number of Bessemer Steel Works building, ...	1	1
Number of Bessemer Converters on September 1, 1884,—46 com- pleted and 3 building, ...	46	36
Annual capacity in ingots, net tons, ...	2,490,000	2,150,000
Number of completed Open-hearth Steel Works, ...	35	27
Number of Open-hearth Steel Works building, ...	3	5
Number of Open-hearth Furnaces on September 1, 1884,—58 completed and 5 building, ...	58	51
Annual capacity in ingots, net tons, ...	550,000	400,000
Number of completed Crucible Cast-steel Works, ...	41	35
Number of Steel-melting Pots, ...	3,594	3,490
Annual capacity in ingots, net tons, ...	115,000	105,000
Number of Miscellaneous Steel Works, ...	6	6
Number of Steel Manipulating Works, ...	55	47
Number of completed Forges, making wrought iron from ore, .	70	72
Annual capacity in blooms and billets, net tons, ...	75,000	75,000
Number of completed Bloomaries, making blooms from pig iron, ...	53	52
Annual capacity in blooms, net tons, ...	70,000	70,000

RECEIVED TOO LATE FOR CORRECTION IN THE
PROPER PLACE.

BLAST FURNACES.

The furnace of the Kent Iron Company (page 3) is 34 x 10. D. J. Warner is president of the company.

The officers of the Macungie Iron Company (page 13) are James Singmaster, President, and R. R. Robb, clerk.

Buchanan & Fisher Limited, P. O. Box 88, Harrisburg, Pa. Cupola furnace, built in 1884, for the production of pig iron from blast-furnace and mill cinder. Owners, Harvey Fisher, George Buchanan, and John H. Scott.

The Brierfield Coal and Iron Company (page 44) is the name of the company which owns Bibb Furnace.

Estill and Fitchburg Furnaces (page 50) are owned by the Central Kentucky Lumber, Mining, Manufacturing, and Transportation Company, Clay City, Powell county.

The Midland Blast-Furnace Company (page 64) has removed its office from 411 Olive st. to the Turner Building on Eighth st., near Olive.

ROLLING MILLS AND STEEL WORKS.

Ellis and Lessig's Steel and Iron Company Limited (page 102) will place in its mill 3 heating furnaces, one train of 22-inch rolls, and 50 nail machines; the works will produce steel nails, and will be put in operation in the spring of 1885. George B. Lessig, President; J. B. Lessig, Secretary; William S. Ellis, Treasurer; Thomas Searles, Superintendent.

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THE
IRON AND STEEL WORKS
OF THE
UNITED STATES.

BLAST FURNACES.

NOTE.—In this book the names of establishments are given first, whenever they have distinctive names, followed by the names of owners and their post-office addresses. Where the kind of power is not mentioned steam-power will be understood. The size of each furnace stack is indicated by two numbers connected by the character "x;" the first number being the height of the stack in feet, and the second number being its diameter in feet at the bosh. References to other iron works owned by the same parties are made in italics. The names of the officers of incorporated companies are printed in connection with rolling mills when both furnaces and rolling mills are owned by them. This Association is not responsible for statements of the kind of product made, nor for the capacity given.

MAINE.

CHARCOAL.

Katahdin Iron Company, Bangor. Furnace in Piscataquis county. One stack, 55 x 9½, built in 1846, rebuilt in 1874, and enlarged in 1877; hot blast; bell-and-hopper top; water and steam power; fuel, charcoal; ore, limonite, yielding from 50 to 55 per cent., obtained about a mile from the works, and roasted in a Davis & Colby calcining kiln; annual capacity, 5,000 net tons. Pig iron branded "Katahdin." Specialty, pig iron for car-wheels and Siemens-Martin steel furnaces. O. W. Davis, Jr., Treasurer and Manager.

Number of furnaces in Maine: 1 charcoal stack.

VERMONT.

CHARCOAL.

Pittsford Furnace, Naylor & Co., 23 Mason Building, Boston, Mass. Works at Pittsford, Rutland county. One stack, 40 x 10, built in 1844; hot blast; steam and water power; fuel, charcoal; ore, Chateaugay self-fluxing magnetic; annual capacity, 4,000 net tons. Formerly owned by the Vermont Iron Company. Brands, "Titan" and "Don."

Number of furnaces in Vermont: 1 charcoal stack.

MASSACHUSETTS.

ANTHRACITE.

Pomeroy Iron Works, West Stockbridge, Berkshire county. One stack, 50 x 14, built in 1850; burned and rebuilt in 1872; open top; fuel, anthracite and coke; product, foundry pig iron, made from a mixture of $\frac{1}{3}$ magnetic ore from Witherbees, Sherman & Co.'s Port Henry mines and $\frac{2}{3}$ hematite ore from the neighborhood of the furnace; annual capacity, 10,000 net tons. Brand, "Pomeroy." W. M. Kniffin, Manager and Treasurer.

CHARCOAL.

Lanesborough Furnace, John L. Colby, Lanesborough, Berkshire county. One stack, 33 x 9 $\frac{1}{2}$, built in 1847; burned June 25, 1882, and rebuilt in 1882-3; hot blast; closed top; ore, local brown hematite; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron.

Richmond Iron Works, Richmond Furnace P. O., Berkshire county. Three stacks, all in Berkshire county: Richmond Furnace, at Richmond, 32 x 9, built in 1829, and rebuilt in 1863; run by steam-power; Van Deusenville Furnace, at Van Deusenville, 32 x 9, built in 1834; rebuilt in 1858; run by water-power; and Cheshire Furnace, at Cheshire, 32 x 9, built in 1850, and rebuilt in 1870; run by steam-power; all use warm blast; ore, brown hematite, from mines owned by the works; total annual capacity, 10,000 net tons of foundry pig iron for cannon, car-wheels, and machinery. Product known as "Richmond" iron. Main office at Richmond Furnace. William H. Barnum, President, Lime Rock, Conn.; George Church, Treasurer, Great Barrington, Mass.; R. A. Burget, Manufacturing Agent, Richmond Furnace.

Number of furnaces in Massachusetts: 5 stacks, of which 1 uses anthracite and coke and 4 use charcoal.

CONNECTICUT.

CHARCOAL.

Canaan Furnaces, Barnum Richardson Company, Lime Rock, Litchfield county. Main office at Lime Rock. Furnaces at East Canaan, Litchfield county. Three stacks: one, 32 x 9, built in 1840; one, 40 x 9, built in 1847; and one, 36 x 9, built in 1872; all use hot blast; water-power; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable purposes, known as "Salisbury" iron; total annual capacity, 12,500 net tons. Wm. H. Barnum, President and Treasurer; Milo B. Richardson, Assistant Treasurer; Charles W. Barnum, Secretary.

Chapinville Furnace, Chapinville, Litchfield county. One stack, 40 x 9, built in 1825, burned in 1879, and rebuilt in 1881; hot blast; open top; water-power; annual capacity, 3,500 net tons. Owned by Mrs. Cornelia Landon. Formerly leased by the Barnum Richardson Company.

Cornwall Bridge Iron Company, Cornwall Bridge, Litchfield county. One stack, 32 x 9, built in 1833; hot blast; water-power. Wm. H.

Barnum, President, Lime Rock; James A. Bierce, Treasurer and Secretary.

Hunts Lyman Iron Company, Huntsville, Litchfield county. One stack, 32 x 9, built in 1847; cold blast; water-power; open top; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 3,500 net tons. George Church, President; Samuel W. Bradley, Secretary; Wm. H. Barnum, Treasurer, and Charles W. Barnum, Assistant Treasurer, Lime Rock.

Kent Furnace, Kent Iron Company, Kent, Litchfield county. One stack, 32 x 9, built in 1849, and rebuilt in 1884; hot blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels; annual capacity, 4,500 net tons. D. J. Warren, President, Salisbury, Conn.; George R. Bull, Secretary; John Hopson, Treasurer and Manager.

Lime Rock Iron Company, Lime Rock, Litchfield county. Established in 1734; first incorporated in 1828; incorporated by the present company in 1863; present furnace, one stack, 32 x 9, built in 1864; warm blast; water-power; open top; ore, Salisbury brown hematite; product, pig iron for car-wheels and malleable purposes; annual capacity, 4,000 net tons. Samuel S. Robbins, President; William H. Barnum, Treasurer; Milo B. Richardson, Secretary and Assistant Treasurer.

Sharon Valley Iron Company, Sharon Valley, Litchfield county. One stack, 31 x 9½; very old; rebuilt in 1863; open top; hot blast; water-power; ore, Salisbury; product, Salisbury car-wheel pig iron; annual capacity, 3,500 net tons. Wm. H. Barnum, President; Charles W. Barnum, Treasurer; Milo B. Richardson, Secretary.

Number of furnaces in Connecticut: 9 charcoal stacks.

NEW YORK.

ANTHRACITE.

Albany and Rensselaer Iron and Steel Company, Troy. Two stacks: Columbia Furnace at Hudson, Columbia county, and Fort Edward Furnace at Fort Edward, Washington county. Columbia Furnace, 40 x 14, built about 1860. Fort Edward Furnace, 50 x 15, built in 1853, and run by water-power. Both use Lake Champlain, African, and Spanish ores; product, Bessemer pig iron; combined annual capacity, 21,000 net tons. *See Rolling Mills.*

Albany City Iron Company, Albany, Albany county. Two stacks, each 60 x 16, built in 1873-4; fuel, anthracite and coke; total annual capacity, 30,000 net tons. Brand, "Olcott." William R. Hills, President and Treasurer; Rufus K. Townsend, Secretary. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Burden Iron Works, Burden Iron Company, Troy, Rensselaer county. Two stacks, each 60 x 16, built in 1865 and 1867; closed tops; ores, magnetic from Northern New York and hematite from Eastern New York; total annual capacity, 30,000 net tons. *See Rolling Mills.*

Cedar Point Furnace No. 1, Cedar Point Iron Company, Port Henry,

Essex county. One stack, 71 x 15, built in 1872-3; first put in blast August 12, 1875; four 22-foot Whitwell stoves; bell-and-hopper top; fuel, anthracite and coke; ores, Old Bed Lake Champlain, New Bed Bessemer Lake Champlain, Kearney from St. Lawrence county, and Manhattan hematite; product, foundry, mill, and Bessemer pig iron; annual capacity, 26,000 net tons. Brand, "Cedar Point." Silas H. Witherbee, President; George R. Sherman, Vice-President; H. B. Willard, Secretary and Treasurer; T. F. Witherbee, Superintendent. The furnace is situated on the bank of Lake Champlain.

Charlotte Furnace, Charlotte Iron Works, 15 Powers' Block, Rochester, Monroe county. Furnace at Charlotte, 7 miles from Rochester, at the mouth of the Genesee river. One stack, 65 x 15, built in 1868, and rebuilt in 1884; three iron-pipe stoves; closed top; fuel, anthracite and coke; annual capacity, 18,000 net tons. Specialty, foundry pig iron. H. C. Roberts, President; George B. Smith, Vice-President; George C. Hopkins, Secretary and Treasurer.

Clove Furnace, Parrott Iron Company, Greenwood Iron Works, Orange county. One stack, 55 x 16, built in 1854; closed top; steam and water power; fuel, anthracite coal and a small percentage of coke; ore, magnetic, obtained from near the furnace and from New Jersey; product, foundry pig iron for fine hardware and stove work; annual capacity, 13,500 net tons. Brand, "Clove." Peter P. Parrott, President; Edward M. Parrott, Vice-President; R. D. A. Parrott, Secretary and Treasurer. Selling agents, Thomas J. Pope & Bro., 292 Pearl st., New York.

Cold Spring Furnace, West Point Furnace Company, Cold Spring, Putnam county. One stack, 60 x 15½, built in 1863; closed top; one Player hot-blast and one set of Ford ovens, five chambers; ores, magnetic and hematite, mined chiefly in New York; product, neutral forge and foundry and Bessemer pig iron; annual capacity, 17,000 net tons. Brand, "West Point." J. C. Kent, President, Phillipsburg, N. J.; J. Wesley Pullman, Secretary and Treasurer, 407 Walnut st., Philadelphia. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Crown Point Furnaces, Crown Point Iron Company, Crown Point, Essex county. Two stacks, situated on the bank of Lake Champlain, 60 x 17 and 70 x 18, built in 1873, and the second stack rebuilt in 1881; six Siemens-Cowper-Cochrane fire-brick stoves, three 15 x 45 and three 16 x 60; closed tops; fuel, anthracite coal and coke; product, Bessemer pig iron, produced from Crown Point (or Penfield) and Chateaugay ore; total annual capacity, 45,000 net tons. Brand, "Crown Point." L. G. B. Cannon, President; H. M. Olmsted, Secretary and Treasurer, 21 Cortlandt st., New York; A. L. Inman, General Manager; H. L. Reed, Cashier and Assistant General Manager; W. S. Green, Superintendent of furnaces. *See Forges.*

Dutchess Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 50 x 12, built in 1873 for charcoal and changed to anthracite in 1877; open top, with "hat;" ores, ¾ local hematite

- and $\frac{1}{2}$ magnetic from Morris county, New Jersey ; product, No. 1 and No. 2 X foundry and chilling pig iron ; annual capacity, 8,400 net tons. Brand, "Dutchess Iron." John S. Schultze, President and Treasurer, 59 Wall st., New York ; H. B. Willits, Secretary. Agents, Crocker Brothers, 32 Cliff st., New York. *See Clove Spring (charcoal) Furnace.*
- Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Two stacks, each 57 x 16, built in 1872 ; one blown in October 5, 1872, and the other subsequently ; closed tops ; fuel, anthracite coal and coke ; total annual capacity, 36,000 net tons. The ores used are hematites from Jefferson and Wayne counties, New York, and Centre county, Pa., and magnetic ores from Lake Superior and Canada. The pig iron produced is used principally at the mills of the company for bar iron, angles, and plates. *See Rolling Mills.*
- Falkkill Iron Company, A. Tower, Agent, Poughkeepsie, Dutchess county. Two stacks, each 60 x 16, built in 1860 ; closed tops ; ores, $\frac{1}{2}$ Dutchess county brown hematite, $\frac{1}{2}$ Lake Champlain magnetic, and $\frac{1}{2}$ Forest of Dean, Orange county ; total annual capacity, 25,000 net tons. James Emott, President ; H. M. Braem, Secretary. Selling agents, Edward Bech & Co., 69 Wall st., New York.
- Franklin Iron Works, Franklin Iron Manufacturing Company, Franklin Iron Works P. O., Oneida county. Two stacks : No. 1, 54 x 14, built in 1870 ; No. 2, 70 x 14, built in 1871, and remodeled in 1883, three fire-brick hot-blast stoves having been added ; closed tops ; fuel, anthracite coal and coke ; ore, fossil, from Oneida county, obtained from 1 $\frac{1}{2}$ to 5 miles from the works ; product, pig iron for stove plates and small castings ; total annual capacity, 36,000 net tons. E. L. Hedstrom, President, Buffalo ; E. F. Holden, Treasurer, Syracuse ; C. H. Smyth, Secretary and Superintendent, at the works.
- Furnaceville Iron Company, 37 Elwood Block, Rochester. Furnace, formerly called Ontario Furnace, situated at Furnaceville, Wayne county. One stack, 50 x 13, first put in blast in October, 1870 ; two Player hot-blast stoves ; closed top ; closed hearth ; annual capacity, 10,250 net tons. Present company organized March 10, 1880. E. H. Harriman, President ; S. J. Macy, Vice-President ; W. H. Averell, Secretary and Treasurer ; E. M. Parrott, Manager.
- Hudson Iron Works, Hudson Iron Company, Hudson, Columbia county. Two stacks, each 49 x 15, built in 1851 ; two Ford hot-blast stoves ; closed tops ; ores, hematite from West Stockbridge, Mass., and Lake Champlain magnetic ; product, principally best quality of foundry iron, though it is also used for best grades of bar iron ; total annual capacity, 26,000 net tons. Brand, "Hudson." J. W. Hoysradt, President and General Agent ; S. Seymour, Secretary and Treasurer.
- Jagger Iron Works, Jagger Iron Company, Albany. Works on Van Rensselaer Island. Two stacks, each 60 x 16, built in 1871 ; ores, Lake Champlain magnetic, and hematite from Columbia county, New York, and Western Massachusetts ; total annual capacity, 25,000 net tons. Specialty, pig iron for stove founders and machinists. Formerly

called Corning Iron Works. James Hendrick, President; William R. Scott, Vice-President; J. M. Davis, Superintendent.

Kirkland Furnace, Kirkland Iron Company, Kirkland, Oneida county. One stack, 65 x 14, built in 1873, reconstructed in 1882, and changed from water to steam power; fuel, anthracite coal and coke; ores, local and Northern New York hematite or fossiliferous and Lake Champlain and Canadian magnetic; annual capacity, 18,000 net tons. Specialty, foundry pig iron. Brand, "Kirkland." Theodore W. Dwight, President; I. A. Williams, General Manager and Treasurer, Utica, N. Y.

Manhattan Iron Works, Manhattan Iron Works Company, Manhattanville, New York City. Two stacks, 49 x 12 and 49 x 13, built in 1851 and 1857; ores, magnetic from Lake Champlain and hematite from Sharon, on the New York and Harlem Railroad; product, neutral pig iron, suitable for foundry or mill purposes; total annual capacity, 18,000 net tons. B. W. Van Voorhis, President; William W. Van Voorhis, Treasurer; Charles Brock, Secretary.

Niagara River Iron Company, Buffalo. Furnace at Iron-ton, Niagara county. One stack, 60 x 16, built in 1873, and put in blast November 7, 1873; Ford hot-blast stoves; annual capacity, 12,000 net tons. Foundation laid for a second stack. Equipment of the best pattern and in complete order. Now idle and offered for sale. Josiah Jewett, Secretary and Treasurer.

Onondaga Iron Company, Syracuse. Works at Geddes, Onondaga county. Two stacks, each 65 x 15½; No. 1 built in 1869-70, blown in June 17, 1870; No. 2 built in 1872, blown in November 14, 1872; fuel, Connellsville coke and anthracite coal; ores, from Ontario, Clinton, and Jefferson counties, New York; product known as "Onondaga" pig iron; total annual capacity, 36,000 net tons. Foundry and mill pig iron are produced; quality nearly neutral, cold-short tendency, well adapted for boiler plate, hoops, and bands. James J. Belden, President; R. Nelson Gere, Vice-President; A. J. Belden, Secretary and Treasurer; W. H. H. Gere, Manager.

Peekskill Furnace, Peekskill Furnace Company, Peekskill, Westchester county. One stack, 60 x 16, built in 1853, and rebuilt in 1874; bell-and-hopper top; annual capacity, 12,000 net tons. Brand, "Peekskill." James L. Flint, General Manager, 33 Broadway, New York; W. H. Campbell, Superintendent, Peekskill.

Port Henry Furnaces, Bay State Iron Company, W. T. Foote, Agent, Port Henry, Essex county. General office, 2 Pemberton Square, Boston, Mass. Two stacks, situated on the bank of Lake Champlain, each 66 x 16, built in 1853 and 1861; rebuilt in 1868 and 1871, respectively; ores, Lake Champlain, Chateaugay, and red ore from St. Lawrence county; product, forge and foundry pig iron; total annual capacity, 30,000 net tons. Brands, "Port Henry" and "Bay State." Selling agents, Crocker Brothers, 32 Cliff st., New York. *See Rolling Mills in Massachusetts.*

Poughkeepsie Iron Company, A. Tower, President and Agent, Pough-

keepsie. Two stacks, 43 x 14 and 46 x 15, built in 1848 and 1854, respectively; open tops; ores, $\frac{1}{3}$ Dutchess county brown hematite, $\frac{1}{3}$ Lake Champlain magnetic, and $\frac{1}{3}$ Forest of Dean, Orange county; product, mainly foundry pig iron; total annual capacity, 20,000 net tons. H. M. Braem, Secretary. Selling agents, Edward Bech & Co., 69 Wall st., New York.

Sterling Iron and Railway Company, 42 Pine st., P. O. Box 1,384, New York. Furnaces in Orange county. Two stacks: Southfield, 45 x 12, built as a charcoal furnace in 1806, converted to anthracite in 1868, and Sterling, 42 x 13, built as a charcoal furnace in 1848, converted to anthracite in 1866; ores, magnetic, mined on the company's property near the furnaces; product, foundry and mill pig iron; total annual capacity, 15,000 net tons. Iron called "Sterling." A. W. Humphreys, President.

Union Iron Works, Union Iron Company of Buffalo, Buffalo, Erie county. Three stacks: No. 1, Pioneer, 50 x 17, built in 1861; No. 2, Excelsior, 50 x 15, built in 1862; No. 3, Monitor, 50 x 14, built in 1865; all have closed tops; ores, hematite, specular, and magnetic, obtained from St. Lawrence county, New York, and from the Lake Superior region; total annual capacity, 28,000 net tons. Specialty, mill pig iron. Brand, "Union." Have not been in blast since 1876. *See Rolling Mills.* Number of anthracite furnaces in New York: 40 stacks.

COKE.

Fletcher Furnace, Fletcher Furnace Company, lessee, Buffalo, Erie county. One stack, 65 x 13, built in 1863, and blown in April 8, 1864; rebuilt in 1881; closed top; one Hamilton hot-blast; fuel, coke; ores, Lake Superior and Lake Champlain, with a small percentage of native; product, foundry pig iron; annual capacity, 18,000 net tons. Brand, "Fletcher." Edmund Carpenter, Agent; F. W. Carpenter, Treasurer; J. C. Kennedy, Manager.

Number of coke furnaces in New York: 1 stack.

CHARCOAL.

Alpine Furnace, Z. H. Benton, Antwerp, Jefferson county. Furnace at Diana, Lewis county. One stack, 40 x 9 $\frac{1}{2}$, built in 1846, and blown in during 1848; warm blast; water-power; ore, black magnetic, from St. Lawrence county, New York; product, car-wheel pig iron; annual capacity, 7,000 net tons. Furnace lands comprise 40,000 acres.

Carthage Furnace, Carthage Iron Company, Carthage, Jefferson county. One stack, 49 x 9, built in 1818, and rebuilt in 1881; warm blast; bell-and-hopper top; water-power; ore, local hematite; product, car-wheel and foundry pig iron; annual capacity, 6,000 net tons. R. N. Gere, President; L. H. Mills, Vice-President; Robert W. Gere, Secretary and Treasurer.

Chatham Furnace, Chatham Furnace Company, Chatham, Columbia county. One stack, 32 x 9, built in 1873; put in blast in July, 1873;

open top; warm blast; ores, brown hematite from Richmond Furnace, Mass., and "Harlem Valley" hematite from Columbia and Dutchess counties; product, pig iron for car-wheels, cannon, chilled rolls, and malleable castings; annual capacity, 5,000 net tons. Formerly called Beckley Iron Works. J. J. Morehouse, President and Treasurer; James Morehouse, Vice-President; Landon Mallory, Secretary.

Clove Spring Furnace, Clove Spring Iron Works, Clove Valley P. O., Dutchess county. One stack, 32 x 9, built in 1830; warm blast; open top; water and steam power; annual capacity, 4,000 net tons. The ore used is Clove hematite from Clove Valley. Specialty, car-wheel chilling pig iron. Brand, "Clove Spring Iron." John S. Schultze, President and Treasurer, 59 Wall st., New York; H. B. Willits, Secretary; Wharton M. Brown, Superintendent. Agents, Crocker Brothers, 32 Cliff st., New York. *See Dutchess (anthracite) Furnace.*

Copake Iron Works, Frederick Miles, Copake Iron Works, Columbia county. One stack, 32 x 9, built in 1872; open top; warm blast; steam and water power; ore, limonite, mined near the furnace. Specialty, car-wheel iron; annual capacity, 4,500 net tons. Brand, "Copake."

Fullerville Iron Works, George H. Clarke, Fullerville, St. Lawrence county. Selling agency, Crocker Brothers, 32 Cliff st., New York. One stack, 33 x 8½, built in 1833; water-power; ore, local red hematite; annual capacity, 2,000 net tons. Put in blast in 1877, after having been idle for many years.

Gere Iron and Mining Company, Port Leyden, Lewis county. Two stacks, Gracie and Fannie, each 51 x 10½, built in 1864, rebuilt in 1880, and burned and rebuilt in 1881; warm blast; bell-and-hopper tops; closed fronts; four 4½-inch tuyeres; Black river water-power; ores, Jefferson county, Old Sterling, Salisbury, and Canadian; total annual capacity, 18,250 net tons. Product, pig iron specially adapted for car-wheels, chilled plows, rolls, and forge purposes. Brand, "Gere." Chill graded. The company has erected works for the distillation of wood, producing charcoal and converting pyroligneous acid into commercial products, and have completed and put into successful operation a Davis-Colby ore roaster. W. H. H. Gere, President, Syracuse; Isaac Maynard, Vice-President, Utica; R. A. Bonta, Treasurer, Syracuse; George D. Colby, Manager, Port Leyden.

Jefferson Iron Company, Antwerp, Jefferson county. Two stacks: Sterlingbush Furnace, at Sterlingbush, Lewis county, 32 x 9, built in 1852; rebuilt in 1873; Sterlingville Furnace, at Sterlingville, Jefferson county, 30 x 9, built in 1866; cold blast; ore, red hematite, from old Sterling mine, on the property; water-power; total annual capacity, 4,000 net tons. Specialty, car-wheel pig iron. President, E. B. Bulkley.

Millerton Iron Company, Irondale, Dutchess county. One stack, 32 x 9; very old; repaired in 1864; open top; hot blast; ore, Salisbury; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron. W. H. Barnum, President; George S. Frink, Secretary and Treasurer.

Phenix Furnace, Caleb S. Maltby, Millerton, Dutchess county. One stack, very old, rebuilt in 1840; 32 x 9; open top; warm blast; ore, Salisbury, from the old Salisbury mine at Ore Hill and neighboring mines; annual capacity, 4,500 net tons. Specialty, car-wheel pig iron. Brand, "Phenix." Edward H. Townsend, Superintendent.

Plattsburgh Furnace, Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. One stack, 45 x 9, first blown in April 7, 1878; closed top; hot blast; annual capacity, 5,000 net tons. Brand, "Chateaugay." Andrew Williams, President; A. L. Inman, General Manager; Smith M. Weed, Secretary; H. M. Olmsted, Treasurer. *See Forges.*

Shaparoon Iron Works, James Beckley, Dover Furnace P. O., Dutchess county. One stack, 40 x 9½, first put in blast in October, 1881; burned October 6, 1883; will be rebuilt in the fall of 1884.

Wassaic Furnace, N. Gridley & Son, Wassaic, Dutchess county. One stack, 32 x 9½, built in 1826, and rebuilt in 1863; warm blast; water-power; ores, Amenia hematite mined in the neighborhood and hematite from the Salisbury region; product, pig iron for car-wheels, chilled rolls, and malleable castings. Brand, "Wassaic." Also produce a special iron with unusual tensile strength from carbonate ore. Brand, "Carbonate." Total annual capacity, 4,000 net tons. Edward Gridley, Manager. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Number of charcoal furnaces in New York: 14 stacks. Total number of furnaces in New York: 55 stacks.

NEW JERSEY.

ANTHRACITE.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren county. Three stacks: two 60 x 18, and one 75 x 18, built in 1848; ore, New Jersey magnetic, from the company's mines; product, all grades of pig iron, with special qualities for plates, sheets, wire, nails, and car-wheel chill; total annual capacity, 50,000 net tons. Brand, "Andover." Philadelphia office, 407 Walnut st. Thomas McKean, President; F. A. Comly, Secretary and Treasurer; J. Wesley Pullman, Agent. Superintendent of works, Joseph C. Kent, Phillipsburg, N. J.

Boonton Iron Works, Estate of J. Couper Lord, Boonton, Morris county. John S. Schultze, General Manager, 59 Wall st., New York. Two stacks, 70 x 14 and 60 x 16, built in 1848 and 1868, respectively; bell-and-hopper tops; steam and water power; total annual capacity, 33,600 net tons. Agents, Crocker Brothers, 32 Cliff st., New York.

Chester Furnace, W. J. Taylor & Co., lessees, Chester, Morris county. One stack, 60 x 13, built in 1878; Weimer suspended pipe stoves, Weimer tubular boilers, and Weimer high-speed blowing engine; product, extra red-short mill pig iron, made from Chester ores, roasted in the Taylor gas kiln; annual capacity, 12,000 net tons. Brand, "Jersey." Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia.

Franklin Iron Company, Franklin Furnace P. O., Sussex county. One

stack, 67 x 20½, completed in October, 1873, and blown in January 1, 1874; closed top; fuel, anthracite and coke; ores, New Jersey and New York; product, Bessemer pig iron; annual capacity, 29,000 net tons. E. F. Hatfield, Jr., President, and Theodore Sturges, Treasurer, 52 Wall st., New York; W. W. Pierce, Secretary, Franklin Furnace, N. J.; E. S. Moffat, Manager.

Musconetcong Iron Works, Stanhope, Sussex county. Selling agents, Crocker Brothers, 32 Cliff st., New York. Two stacks, 70 x 16½ and 80 x 20, built in 1864 and 1869, and blown in in 1866 and 1871; closed tops; ore, magnetic, mined in Morris and Sussex counties; total annual capacity, 50,000 net tons. Specialty, No. 2 foundry and gray forge pig iron. Brand, "Musconetcong." President, A. Pardee, Hazleton, Pa.; Secretary and Treasurer, H. H. Wilson, 237 South Third st., Philadelphia; Superintendent, I. P. Pardee, Stanhope, N. J.

New Jersey Zinc and Iron Company, Newark, Essex county. Sales office, 61 Maiden Lane, New York. Three stacks: two, each 20 x 7, built in 1855 and 1863, open tops, and one 30 x 7, built in 1871, closed top; product, spiegeleisen, from zinc residuum; combined annual capacity, 6,600 net tons. B. G. Clarke, President, and Theodore Sturges, Treasurer, 52 Wall st., New York; A. H. Farlin, Manager, Newark.

Oxford Iron Works, Oxford Iron and Nail Company, Oxford, Warren county. Two stacks, 36 x 10 and 50 x 18, built in 1742 and 1871, respectively; closed tops; fuel, anthracite coal; ore, magnetic, mined near the works; combined annual capacity, 19,000 net tons. Product is worked up into nails, etc., by the company, only a small quantity of foundry pig iron being made and sold. J. S. Scranton, Sales agent, 83 Washington st., New York. *See Rolling Mills.*

Passaic Zinc Company, 111 Liberty st., New York. Furnace in Hudson county, New Jersey. One stack, 40 x 10, built in 1883, and first put in blast in February, 1884; closed top; fuel, anthracite coal; product, spiegeleisen, from zinc residuum; annual capacity, 4,500 net tons. William Reynolds Brown, President; R. H. Manning, Secretary; Charles E. Maxwell, Treasurer; Aaron Clark, Superintendent. Selling agents, Manning & Squier, 111 Liberty st., New York.

Pequest and Ringwood Furnaces, Cooper & Hewitt, 17 Burling Slip, New York. Two stacks: Pequest Furnace, at Oxford, Warren county, 67½ x 16½, built in 1874, and rebuilt in 1883; three Cooper-Durham hot-blast stoves; closed top; fuel, ⅔ anthracite coal and ⅓ Connellsville coke; ore, New Jersey magnetic; product, foundry and gray forge pig iron; estimated annual capacity, 22,500 net tons. B. F. Fackenthal, Jr., General Manager. Ringwood Furnaces, at Hewitt, Passaic county, one completed stack, 48 x 13, and one unfinished stack, 65 x 16; open tops; water-power. The former was altered from charcoal to anthracite in 1872. Ore, magnetic, mined at Ringwood. Use the Cooper iron hot-blast arrangement. *See Durham Iron Works, Lehigh Valley, Pennsylvania.*

Port Oram and Warren Furnaces, Joseph Wharton, P. O. Box 1332, Phila-

delphia. Two stacks: Port Oram Furnace, at Port Oram, Morris county, 60 x 16, built in 1868, and first blown in in 1869; bought by Joseph Wharton in 1881, and by him put in thorough order; closed top; ores, local magnetites. Warren Furnace, at Hackettstown, Warren county, 56 x 16, built in 1874-5, and put in blast in 1875; bought by Joseph Wharton in 1879; formerly called Hackettstown Furnace; ores, mainly North Jersey magnetic, with mixture of hematite. Product, mostly mill pig iron; total annual capacity, 31,000 net tons.

Secaucus Iron Company, Secaucus, Hudson county. One stack, 65 x 16½, completed in 1877, and first blown in in June, 1879; four Cooper hot-blast stoves; closed top; fuel, anthracite and coke; ores, ½ foreign hematites and ½ New York and New Jersey magnetites; product, Bessemer pig iron; annual capacity, 23,000 net tons. A. Pardee, President, Hazleton, Pa.; I. P. Pardee, Treasurer, Stanhope, N. J.; Kenneth Robertson, Superintendent, Secaucus, N. J. Selling agents, Crocker Brothers, 32 Cliff st., New York.

Number of furnaces in New Jersey: 20 completed anthracite stacks, and 1 unfinished stack.

PENNSYLVANIA.

LEHIGH VALLEY ANTHRACITE.

Allentown Iron Works, Allentown, Lehigh county. Office, 222 and 224 South Third st., Philadelphia. Five stacks: No. 1, 53½ x 14½, and No. 2, 60 x 15½, built and blown in in 1846; No. 3, 53½ x 15, built in 1853, and blown in in 1854; No. 4, 53½ x 16½, built in 1854, and blown in in 1855; No. 5, 60 x 17, built in 1872, and blown in in 1873; four open tops and one closed; ores, magnetic from New Jersey and hematite from Lehigh and Berks counties, Pa.; foundry pig iron is a specialty; total annual capacity, 60,000 net tons. Brand, "Allentown." Stephen B. Neumoyer, Manager, at the works.

Allentown Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown. Two stacks, each 68 x 15, built in 1864; open tops; fuel, anthracite coal; ores, hematite and New Jersey magnetic; product, mill iron; total annual capacity, 24,000 net tons. *See Rolling Mills.*

Bethlehem Iron Company, Bethlehem, Northampton county. Eight stacks: No. 1, 62 x 16, built in 1863; No. 2, 70 x 17, built in 1867; No. 3, 50 x 13, built in 1868; No. 4, 70 x 17½, built in 1874-5; No. 5, 70 x 18½, built in 1874-5; No. 6, 70 x 17½, built in 1881; all have closed tops. (Old No. 6, 27 x 7½, built in 1874-5, and sold and removed in 1881.) No. 7, 70 x 19, situated at Bingen, Northampton county, built in 1870; formerly called North Penn Furnace. Specialty, Bessemer pig iron, from local and foreign hematite and magnetic ores; fuel, anthracite and bituminous coal and Connellsville coke; total annual capacity, 150,000 net tons. This company also leases and operates the Northampton Furnace at Freemansburg, Northampton county, which consists of one stack, 64 x 16, first blown in July 17, 1873; closed top; annual capacity, 11,200 net tons. *See Rolling Mills.*

- Carbon Iron Works, Carbon Iron and Pipe Company Limited, Mauch Chunk, Carbon county. Works at Parryville. Formerly owned by the Carbon Iron Company, but since 1879 by the present owner. Three stacks, 52 x 13, 52 x 16, and 65 x 16, built in 1855, 1864, and 1869, respectively; one open and two closed tops; fuel, anthracite coal; ores, hematite from Lehigh, Northampton, and Carbon counties, and magnetic from New Jersey and Lake Champlain; total annual capacity, 30,000 net tons. Product known as "Carbon" iron. The manufacture of cast-iron pipe was commenced in June, 1884. A. A. Douglas, Chairman, Mauch Chunk; George Ruddle, Secretary and Treasurer, Mauch Chunk; H. P. Cooper, Superintendent, Parryville. Selling agents, G. W. Stetson & Co., 69 Wall st., New York.
- Coleraine Iron Works, Wm. T. Carter & Co., 302 Walnut st., Philadelphia. Works at Redington, Northampton county. Two stacks, each 60 x 17, built in 1869 and 1872; ores, $\frac{1}{2}$ hematite and $\frac{1}{2}$ magnetic; product, foundry pig iron; total annual capacity, 26,000 net tons.
- Coplay Iron Company Limited, Coplay, Lehigh county. Three stacks, 60 x 14, 55 x 16, and 55 x 16, built in 1853, 1862, and 1868, respectively; ores, Lehigh county hematites and New Jersey magnetics; open tops; product, principally foundry pig iron; total annual capacity, 30,000 net tons. Formerly owned by the Lehigh Valley Iron Company. E. P. Wilbur, Chairman, Bethlehem; Wm. H. Ainey, Secretary and Treasurer, Allentown; A. F. K. Kront, Clerk, Coplay.
- Crane Iron Works, Crane Iron Company, 224 South Fourth st., Philadelphia. Works at Catasauqua, Lehigh county. Five stacks: one 75 x 18, two 60 x 17, and two 60 x 17 $\frac{1}{2}$. Present furnaces built in 1850, 1867, and 1881; original furnaces built in 1839, 1842, and 1846. All have closed tops; two have iron hot-blast stoves, and three have Whitwell fire-brick stoves; fuel, anthracite coal; ores, New Jersey magnetic, and brown hematite from Lehigh, Berks, and Northampton counties in Pennsylvania; specialty, machinery, stove, foundry, and Bessemer pig iron; annual capacity, 100,000 net tons. Brand, "Crane." Samuel Dickson, President; Geo. T. Barns, Secretary and Treasurer. Officers at the works: Joseph Hunt, Superintendent; John Williams, Cashier.
- Durham Iron Works, Cooper & Hewitt, Riegelsville, Bucks county. New York office, 17 Burling Slip. One stack, 75 x 19, built in 1874, and blown in in February, 1876; eight Cooper-Durham hot-blast stoves; closed top; fuel, $\frac{1}{2}$ anthracite and $\frac{1}{2}$ Connellsville coke; ores, hematite and magnetic from Durham, Pa., and magnetic from Ringwood and Charlotteburg, New Jersey; specialty, gray forge pig iron; annual capacity, 36,000 net tons. Brand, "Durham." The two old stacks, built in 1848 and 1851, have been demolished. B. F. Fackenthal, Jr., Superintendent. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia. *See Pequest and Ringwood Furnaces, New Jersey.*
- Emaus Furnace, Ormrod, Fisher & Co., lessees, Emaus, Lehigh county. Main office, 226 Walnut st., Philadelphia. One stack, 65 x 16, com-

pleted and first put in blast October 10, 1872; rebuilt in 1879-80; put in blast by lessees September 12, 1881; closed top; ores, $\frac{3}{4}$ local hematite and $\frac{1}{4}$ New Jersey magnetic; specialty, foundry pig iron; annual capacity, 15,000 net tons. Brand, "Emaus." George Ormrod, Superintendent. During 1883 the lessees of the furnace built a foundry for the production of cast-iron gas and water pipe, with a daily capacity of 20 net tons. Selling agents, Donaldson & Thomas, 226 Walnut st., Philadelphia.

Glendon Iron Works, Glendon Iron Company, Easton, Northampton county. Five stacks: one 47 x 15, one 72 x 18, one 63 x 16, and two 81 x 18, built in 1852, 1869, 1874, 1880, and 1881, respectively. Original furnaces were built in 1843, 1844, 1850, 1852, and 1869. These furnaces are at Glendon, near Easton, except Furnace No. 4, which is situated at South Easton. No. 4 is blown by water-power; all closed tops except No. 4; fuel, anthracite coal; ores, hematite from Northampton county, Pa., and magnetic from Morris county, N. J.; specialty, forge pig iron; total annual capacity, 90,000 net tons. Brand, "Glendon." Principal office at Boston, Mass. Augustus Lowell, President, Boston; Thomas T. Bouvé, Secretary and Treasurer, Boston; Frank Firmstone, Superintendent, Easton.

Lehigh Iron Company, Allentown, Lehigh county. Two stacks, 55 x 16 and 60 x 17; No. 1, completed July 22, 1869, and No. 2, October 21, 1872; two cast-iron hot-blast stoves; open top; fuel, anthracite coal; ores, Lehigh county hematite and New Jersey magnetic; specialty, foundry pig iron; total annual capacity, 21,000 net tons. Brand, "Lehigh." W. H. Ainey, President and Treasurer; H. Bortz, Secretary and Manager of the works.

Lehigh Zinc and Iron Company Limited, Bethlehem, Northampton county. Main office, 212 Walnut st., Philadelphia. One stack, 33 x 8 $\frac{1}{2}$ first put in blast in February, 1882; two iron hot-blast stoves; closed top; fuel, $\frac{3}{4}$ anthracite and $\frac{1}{4}$ Connellsville coke; ore, residuum from Franklinite ore, after the zinc has been extracted; product, spiegel-eisen; annual capacity, 2,800 net tons. Richard Heckscher, President; S. P. Wetherill, Secretary; August Heckscher, Treasurer; J. Price Wetherill, Manager.

Lucy Furnace, Lucy Furnace Company, South Bethlehem, Northampton county. Furnace at Glendon, Northampton county. One stack, 65 x 15, built and put in blast in 1872; rebuilt in 1880; bell-and-hopper top; fuel, anthracite coal; ores, New Jersey magnetic and local hematite; product, foundry pig iron; annual capacity, 9,500 net tons. Brand, "Lucy." Formerly called Uhler Furnace. W. A. Wilbur, Superintendent. Owned by G. B. Linderman, E. P. Wilbur, and Henry Green.

Macungie Furnace, Macungie Iron Company, Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in September 14, 1874; closed top; fuel, anthracite coal; ores, $\frac{3}{4}$ native hematite and $\frac{1}{4}$ New Jersey magnetic; specialty, foundry pig iron; annual capacity, 13,500

net tons. Formerly owned by the Millerstown Iron Company. William L. Schaffer, President and Treasurer, Philadelphia; R. R. Robb, Secretary, Philadelphia; Wm. M. Weaver, Superintendent, Macungie. Selling agents, Robb & Matthews, 205 Walnut Place, Philadelphia.

Saucon Furnaces, Saucon Iron Company, Hellertown, Northampton county. Two stacks, 50 x 16 and 60 x 16; put in operation March 25, 1868, and May 25, 1870, respectively; one open and one closed top; ores, Saucon valley hematite and New Jersey magnetic; specialty, foundry pig iron; total annual capacity, 25,000 net tons. Brand, "Saucon." Joseph B. Altemus, President, 220 Chestnut st., Philadelphia; M. Fackenthall, Secretary and Superintendent, Hellertown; Samuel G. Scott, Assistant Treasurer; J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia, exclusive sales agents.

Thomas Iron Works, Thomas Iron Company, Hokendauqua, Lehigh county. Nine stacks: six at Hokendauqua, two (Lock Ridge) at Alburtis, Lehigh county, and one (Keystone) at Glendon, Northampton county. At Hokendauqua there are four stacks 60 x 18 and two 65 x 18, of which two were built in 1855, two in 1863, and two in 1873. At Alburtis both stacks are 62 x 15, and were built in 1867 and 1869. At Glendon the stack is 65 x 16, and was first put in blast April 17, 1876. All use native hematite and New Jersey magnetic ores; product, foundry and forge pig iron; total annual capacity, 131,000 net tons. Samuel Thomas, President; J. T. Knight, Secretary and Treasurer, Easton; John Thomas, General Superintendent; David H. Thomas, Superintendent of Lock Ridge Furnaces.

Number of furnaces in the Lehigh region: 51 anthracite stacks.

SCHUYLKILL VALLEY ANTHRACITE.

Anvil Furnace, Pottstown Iron Company, Pottstown, Montgomery county. One stack, 65 x 16, built in 1867, and blown in in December, 1867; two iron hot-blast stoves; closed top; fuel, anthracite coal and coke; ores, magnetic and hematite, mined partly at Hopewell, Chester county; specialty, mill pig iron; annual capacity, 20,000 net tons. Brand, "Anvil." See *Rolling Mills*.

Edgehill Furnace, Joseph E. Thropp & Co., lessees, Edgehill, Montgomery county. One stack, 64 x 16, built in 1869-72; first blown in in January, 1872; two iron hot-blast stoves; closed top and closed front; fuel, anthracite coal and coke; ores, hematite from Montgomery county and magnetic from New York and New Jersey; annual capacity, 18,000 net tons; specialty, gray forge pig iron. Brand, "Edgehill."

Henry Clay Furnaces, Eckert & Brother, Reading, Berks county. Two stacks, each 57 x 13; one built in 1842, and blown in in August, 1844; the other built in 1855, and blown in in September, 1856; four iron hot-blast stoves; closed tops; fuel, anthracite coal and coke; ores, hematite and magnetic from Berks and Lebanon counties; product, No. 2 foundry and gray forge pig iron; total annual capacity, 22,000 net tons. Brand, "Henry Clay." Selling agent, Charles W. Matthews, Phila.

Keystone Furnaces, E. & G. Brooke Iron Company, Birdsboro, Berks county. Three stacks: one, 50 x 12, built in 1853; one, 55 x 15, built in 1871; one, 60 x 16, built in 1873; closed tops; fuel, anthracite coal and coke; ores, principally magnetic, with a mixture of hematite; product, forge pig iron; annual capacity, 50,000 net tons. Brand, "Keystone." See *Charcoal Furnaces*. See *Rolling Mills*.

Keystone Furnaces of Reading, Keystone Furnace Company, Reading, Berks county. Two stacks: one, 50 x 15, built in 1869; the other, 50 x 14, built in 1872-3, blown in during June, 1873; closed tops; total annual capacity, 20,500 net tons. Jacob Bushong, President; H. M. Bushong, Secretary and Treasurer; Henry Bushong, General Manager. Sales agents, Crocker Brothers, 32 Cliff st., New York.

Leesport Furnace, Leesport Iron Company, Leesport, Berks county. One stack, 55 x 15, built in 1852, first blown in in 1853, and rebuilt in 1871; closed top; fuel, $\frac{3}{4}$ anthracite coal and $\frac{1}{4}$ coke; ores, $\frac{3}{4}$ hematite from Moselem, Berks county, and $\frac{1}{4}$ magnetic from Cornwall, Lebanon county; specialty, foundry pig iron; annual capacity, 14,000 net tons. Brand, "Leesport." John G. Kaufman, President; H. H. Muhlenberg, Secretary; L. M. Kaufman, Treasurer and Superintendent. J. J. Mohr, selling agent, 430 Walnut st., Philadelphia.

Merion and Elizabeth Furnaces, Merion Iron Company, West Conshohocken, Montgomery county. Philadelphia office, 209 Walnut Place. Two stacks: Merion Furnace, 48 x 16, built in 1847, and enlarged in 1876; Elizabeth Furnace, 50 x 16, built in 1872; put in blast October 24, 1872; both stacks remodeled in 1883; Merion has three Player ovens and Elizabeth five Ford ovens, producing an average heat of 900 degrees; ores, New York and New Jersey magnetic and local hematite; product, foundry and forge pig iron; combined capacity, about 700 net tons per week. Brand, "Merion." Specialty, neutral gray forge pig iron for boiler plate and sheet iron. J. B. Moorhead, President.

Monocacy Furnace, Monocacy Furnace Company, Monocacy, Berks county. One stack, 50 x 13, built at Hopewell in 1852; removed to Monocacy in 1854; specialty, foundry pig iron; annual capacity, 10,000 net tons. Brand, "Monocacy." Formerly called Theresa Furnace. J. Barclay Hacker, President.

Montgomery Furnace, Montgomery Iron Company, Port Kennedy, Montgomery county. One stack, 50 x 14, built in 1854, and first blown in in 1856; remodeled in 1863 and again in 1869; closed top; three iron hot-blast stoves; ores, $\frac{3}{4}$ magnetic and $\frac{1}{4}$ hematite; specialty, forge pig iron; annual capacity, 12,500 net tons. Brand, "Montgomery." Two roasters for magnetic ores were added in 1880. Abraham S. Patterson, President; Joseph Storm Patterson, Secretary and Treasurer; John W. Eckman, Manager.

Moselem Furnace, Leibrandt & McDowell, Moselem, Berks county. Philadelphia office, 123 North Second st. One stack, 49 x 12, built in 1823 for charcoal, and rebuilt several times; two Ford hot-blast stoves;

- closed top; fuel, anthracite coal; ores, $\frac{3}{4}$ Moselem hematite and $\frac{1}{4}$ Cornwall and New Jersey magnetic; specialty, foundry pig iron; annual capacity, 8,000 net tons. Brand, "Moselem."
- Mt. Laurel Furnace, Clymer Iron Company, Temple, Berks county. Furnace at Mt. Laurel. One stack, 50 x 11, built in 1836, rebuilt in 1847, and changed to anthracite in 1873, but not afterwards blown in until February 1, 1880; closed top; two hot-blast stoves; ore, principally hematite; product, foundry pig iron; annual capacity, 7,000 net tons. George E. Clymer, President; Abram Sweitzer, Treasurer and Superintendent. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia. *See Charcoal Furnaces.*
- Norristown Iron Works, James Hooven & Son, Norristown, Montgomery county. One stack, 55 x 16, built in 1869, and rebuilt in 1871; four 18-pipe Player hot-blast stoves; open top; fuel, anthracite coal and coke; ores, hematite and magnetic, from Pennsylvania, New Jersey, and foreign countries; product, gray forge pig iron, nearly all of which is used in their rolling mill; annual capacity, 13,500 net tons. James Hooven, owner. *See Rolling Mills.*
- Norway Furnace, Gabel, Jones & Gabel, lessees, Pottstown. Furnace at Bechtelsville, Berks county. One stack, 58 $\frac{1}{2}$ x 14, built in 1875; open top; one iron hot-blast stove; ore, Berks county magnetic; product, foundry and mill pig iron; annual capacity, 16,000 net tons. Brand, "Norway." Jacob H. Gabel, Treasurer; Griffith Jones, Superintendent. Selling agents, L. & R. Wister & Co., 230 South Fourth st., Phila.
- Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Six completed stacks and one unfinished stack. East Penn Furnaces, at Lyons Station, Berks county. Two stacks, each 48 x 12, built in 1874-5; injured by fire in 1881, but to be rebuilt; closed tops; total annual capacity, 17,000 net tons. Kutztown Furnace, at Kutztown, Berks county. One stack, 55 x 15, built in 1875; closed top; annual capacity, 8,300 net tons. Swede Furnace, at Swedeland, Montgomery county. One completed stack, 73 x 14, built in 1850, and rebuilt in 1881; closed top; Weimer suspended pipe stoves; annual capacity, 15,000 net tons. One stack partly constructed, 73 x 16. Minersville Furnace, at Minersville, Schuylkill county. One stack, 55 x 15, built in 1872-3; first blown in September 5, 1873; rebuilt in 1880; bell-and-hopper top; weekly capacity, 200 net tons. Out of blast since 1875. Port Carbon Furnace, at Port Carbon, Schuylkill county. One stack, 52 x 15, built in 1872, and put in blast in September, 1872; rebuilt in 1879 and 1881; closed top. *See Virginia (coke) Furnaces. See Rolling Mills.*
- Philadelphia Furnace, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. One stack, 58 x 14, built in 1873, and blown in December 5, 1873; closed top; ores, hematite and magnetic, from Pennsylvania, New York, Delaware, and Spain; product, forge and foundry pig iron; annual capacity, 10,000 net tons. *See Rolling Mills.*
- Phoenix Iron Works, Phoenix Iron Company, Phoenixville, Chester

county. Office, 410 Walnut st., Philadelphia. Three stacks: No. 1, 59 x 15, built in 1845, and rebuilt in 1871; No. 2, 58½ x 15, built in 1845, and rebuilt in 1871; No. 3, 59 x 15, built in 1849; closed tops; fuel, anthracite coal and coke; ores, magnetic and hematite, from Berks and Chester counties, and New Jersey and foreign; specialty, gray forge pig iron; total annual capacity, 45,000 net tons. Brand, "Phoenix." Wm. St. G. Kent, Blast-furnace Manager. *See Rolling Mills.*

Pioneer Furnaces, Pottsville Iron and Steel Company, Pottsville, Schuylkill county. Three stacks: one, 50 x 12, rebuilt in 1853; one, 50 x 13½, built in 1866; and one, 55 x 15, built in 1872; closed tops; fuel, ¾ anthracite and ¼ coke; ores, magnetic and hematite, from New Jersey and Pennsylvania; product, Bessemer, forge, and foundry pig iron; specialty, forge iron; total annual capacity, 35,000 net tons. Brand, "Pioneer." *See Rolling Mills.*

Plymouth Rolling Mill Company, S. Fulton, General Superintendent, 261 South Fourth st., Philadelphia. Three stacks: Plymouth Furnaces at Conshohocken and Lucinda Furnace at Norristown, all in Montgomery county. Plymouth Furnaces have two stacks, 55 x 15 and 56 x 13, built in 1845 and 1864, respectively; Lucinda Furnace is 40 x 13, built in 1856; closed tops; ores, Pennsylvania hematite and magnetic; product, foundry and forge pig iron; total annual capacity, 30,000 net tons. Brands, "Plymouth" and "Lucinda." *See Rolling Mills.*

Reading Iron Works, Reading, Berks county. Office, 259 South Fourth st., Philadelphia. Two stacks, 55 x 15 and 55 x 16, built in 1854 and 1873, respectively; closed tops; ore, principally hematite from Lehigh and Lebanon counties; product, foundry and mill pig iron; total annual capacity, 20,000 net tons. *See Rolling Mills.*

Robesonia Furnace, Ferguson, White & Co., Robesonia Furnaces P. O., Berks county. One stack, 80 x 18, built in 1858, and rebuilt in 1874, and again in 1884; three Whitwell hot-blast stoves; closed top; fuel, anthracite coal and coke; Cornwall ore is exclusively used; product, red-short pig iron for Bessemer steel and bar iron; annual capacity, 25,000 net tons. Brand, "Robesonia." Nathaniel Ferguson, President; Albert Ferguson, Superintendent. Selling agents, J. Tatnall Lea & Co., 400 Chestnut st., Philadelphia.

Sheridan, Topton, and Ringgold Furnaces, Wm. M. Kaufman & Co., Reading. Four stacks: Sheridan Furnaces, at Sheridan, Lebanon county. Two stacks: one, 80 x 13, built in 1862 to use charcoal, and changed to anthracite in 1867; the other, 55 x 16, built in 1874-5; closed tops; total annual capacity, 18,000 net tons. Topton Furnace, at Topton, Berks county, 55 x 16, built in 1873. Ringgold Furnace, at New Ringgold, Schuylkill county, 55 x 14½, built in 1873; blown in February 28, 1874; annual capacity, 7,000 net tons. Product, foundry and gray forge pig iron. Isaac Eckert, Manager.

Temple Furnace, Temple Iron Company, Temple, Berks county. One stack, 55 x 14, built in 1867, and rebuilt in 1875; two iron hot-blast

stoves; closed top; ores, from Lehigh, Berks, and Lebanon counties and from New Jersey; specialty, foundry pig iron; annual capacity, 12,000 net tons. George F. Baer, President; Edward T. Clymer, Treasurer. Selling agent, J. J. Mohr, 430 Walnut st., Philadelphia.

Warwick Furnace, Warwick Iron Company, Pottstown, Montgomery county. One stack, 55 x 16, built in 1875, and first blown in in 1876; two iron hot-blast stoves; closed top; ores, magnetic from Boyertown and Seisholtzville, Berks county, hematite from Flourtown, Montgomery county, and magnetic from New Jersey; specialty, mill pig iron; annual capacity, 24,000 net tons. Brand, "Warwick." Isaac Fegely, President; V. P. McCully, Secretary; Jacob Fegely, Jr., Treasurer; Edgar S. Cook, Manager.

William Penn Furnace, D. O. Hitner, William Penn P. O., Montgomery county. One stack, 40 x 12½, built in 1854; open top; ores, New York magnetic and local brown hematite; product, foundry and forge pig iron; estimated annual capacity, 6,000 net tons. Two stacks, one, 35 x 12, built in 1844, and one, 50 x 14, built in 1845, were purchased by the Pennsylvania Schuylkill Valley Railroad Company in 1883, and torn down.

Number of furnaces in the Schuylkill region: 44 completed anthracite stacks, and 1 unfinished stack.

UPPER SUSQUEHANNA ANTHRACITE.

Atlas Furnace, Red Run Coal Company, Roaring Branch, Lycoming county. One stack, 40 x 11, built in 1854, and first blown in in 1874; hot-blast; closed top; fuel, anthracite coal; local ore; annual capacity, 5,000 net tons. Formerly called Carterville Furnace. E. N. Brigham, President; C. S. Green, Secretary and Treasurer.

Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 49 x 14, built in 1853-4, and blown in April 14, 1854; rebuilt in 1881; open top; hot blast; ores, fossil, mined in the vicinity, and magnetic from New York; product, foundry and forge pig iron of extra quality; annual capacity, 10,000 net tons. Brand, "Bloom."

Chulasky Furnace, Creveling, Miles & Co. Limited, Chulasky, Northumberland county. Office, Danville, Montour county. One stack, 42 x 14, built in 1846; ores mined on the property; specialty, gray forge pig iron; annual capacity, 6,500 net tons.

Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks, 39 x 14 and 50 x 14, built in 1840 and 1860, respectively; two iron hot-blast stoves; open tops; ore, mostly native Clinton fossil; product, foundry pig iron; total annual capacity, 15,200 net tons.

Danville Furnaces, Danville Furnace Company Limited, Danville, Montour county. Two stacks, 61 x 16 and 43 x 13, built in 1869 and 1867, respectively; both remodeled in 1884; closed tops; fuel, anthracite coal and coke; ores, soft fossil and hematite, mined in Montour county (Pa.) and in the Shenandoah Valley (Va.); specialty, neutral foundry and mill pig iron; total annual capacity, 30,000 net tons. Wm. Whit-

- mer, President; J. M. Maris, Jr., Secretary and Superintendent; G. W. Miles, Treasurer and Manager.
- Duncannon Furnace, Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. One stack, 60 x 15, built in 1853, and rebuilt in 1880; two Player iron hot-blast stoves; closed top; fuel, $\frac{1}{2}$ anthracite and $\frac{1}{2}$ coke; ores, Cornwall magnetic from Lebanon county and hematite from Mifflin county and from Virginia; specialty, mill pig iron; annual capacity, 20,000 net tons. Brand, "Duncannon." *See Rolling Mills.*
- Frances Furnace, James S. Marsh, Northumberland, Northumberland county. One stack, 60 x 18, built in 1872; first put in blast in 1880.
- Glamorgan Furnaces, Glamorgan Iron Company, Lewistown, Mifflin county. One completed stack, 46 x 13 $\frac{1}{2}$, built in 1868, and one stack, 54 x 14 $\frac{1}{2}$, built in 1872, torn down in 1884, and being rebuilt to 70 x 15; fuel, anthracite and coke; ores, native fossil and hematite; product, principally gray forge pig iron, neutral, inclining to red-short; annual capacity of the completed stack, 9,000 net tons. The new stack will have an annual capacity of 18,000 net tons. Percival Roberts, President; J. W. Davis, Treasurer; T. W. McCune, Superintendent. Philadelphia office, 261 South Fourth st.
- Irondale Furnaces, Bloomsburg Iron Company, Bloomsburg, Columbia county. Two stacks, 36 x 12 and 36 x 14, built in 1844 and 1845; open tops; water-power; ores, fossil, mined in Columbia and Snyder counties, and magnetic, mined near Port Oram, New Jersey. "A No. 1" foundry pig iron is very soft, open-grained, and strong; No. 1 foundry is much the same; No. 2 is much used in the manufacture of car-wheels; gray forge is nearly neutral, and has great tensile strength; total annual capacity, 16,000 net tons. Brand, "Irondale." Charles R. Paxton, President, Bloomsburg; Wm. E. S. Baker, Treasurer, 122 Race st., Philadelphia; E. R. Drinker, Manager.
- Lackawanna Furnaces, Lackawanna Iron and Steel Company, Scranton, Lackawanna county. Five stacks: two built in 1849, one in 1852, one in 1854, and one in 1872; sizes, 67 x 20 $\frac{1}{2}$, 65 x 17, 65 x 17, 70 x 17 $\frac{1}{2}$, and 70 x 19; eleven iron hot-blast stoves; closed tops; fuel, anthracite coal and coke; ores, New Jersey, Lake Champlain, and Tilly Foster; product, Bessemer pig iron; total annual capacity, 110,000 net tons. Brand, "Lackawanna." E. S. Moffat, Superintendent, Scranton, Pa. New York office, 52 Wall st. *See Rolling Mills.*
- Lycoming Furnace, David A. Jones & Co., Pottsville, Schuylkill county. Furnace at Ralston, Lycoming county. One stack, 42 x 12 $\frac{1}{2}$, first put in operation in August, 1874, but only in operation for a short time; closed top; annual capacity, 6,000 net tons.
- Mansfield Furnace, Shaaber, Johnston & Co., Reading, Pa. Furnace at Mansfield, Tioga county. One stack, 36 x 10, built in 1854; fuel, $\frac{1}{2}$ coke and $\frac{1}{2}$ anthracite. I. M. Phelps, Superintendent.
- Marshall Furnace, Marshall Bros. & Co., Newport, Perry county. Philadelphia office, Front st. and Girard avenue. One stack, 60 x 13, built

in 1872, and blown in in July, 1872; closed top; fuel, $\frac{3}{4}$ coke and $\frac{1}{4}$ anthracite; ores, magnetic, fossil, and hematite, from York, Cumberland, Perry, and Juniata counties; specialty, pig iron for foundry use and for sheet-iron blooms; annual capacity, 15,000 net tons. Brand, "Marshall." P. Hiestand, Superintendent. *See Rolling Mills.*

Montour Iron and Steel Works, Montour Iron and Steel Company, Danville, Montour county. Two stacks, each 52 x 15, built in 1842; two iron hot-blast stoves; closed top; fuel, $\frac{3}{4}$ anthracite coal and $\frac{1}{4}$ coke; ores, local fossil; product, cold-short foundry pig iron; total annual capacity, 24,000 net tons. *See Rolling Mills.*

Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; ore, fossil; product, principally foundry iron; annual capacity, 7,000 net tons. Dr. L. Rooke, Manager. Number of furnaces in the Upper Susquehanna region: 23 completed anthracite stacks, and 1 stack building.

LOWER SUSQUEHANNA ANTHRACITE.

Aurora Furnace, Wrightsville Iron Company, Wrightsville, York county. One stack, 50 x 12, built in 1867; rebuilt in 1874; iron shell; bell-and-hopper top; fuel, anthracite coal and coke; ores, hematite, specular, and magnetic, from York county and Cornwall; product, neutral gray forge and foundry pig iron; annual capacity, 7,500 net tons. Michael Schall, President; F. J. Magee, Secretary; H. Wilton, Treasurer and Manager.

Bird Coleman, Donaghmore, and North Cornwall Furnaces, W. C. Freeman, General Superintendent, Cornwall, Lebanon county. Four completed stacks: Bird Coleman Furnaces, owned by R. W. Coleman's heirs; No. 1, 65 x 15, built in 1872-3; No. 2, 52 x 15, built in 1879-80. Donaghmore Furnace, owned by R. W. Coleman's heirs; one stack, 44 x 14, built in 1855. North Cornwall Furnace, owned by Mrs. M. C. Freeman; one stack, 52 x 15, built in 1872-4. Use Cornwall ore exclusively. *See Charcoal Furnaces.*

Cameron Furnace, Cameron Furnace Company, Middletown, Dauphin county. One stack, 47 $\frac{1}{2}$ x 13 $\frac{1}{2}$, built in 1857; 3 tuyeres; bell-and-hopper top; ores, York and Cumberland hematite; product, principally forge pig iron; annual capacity, 9,000 net tons. Brand, "Cameron." James Young, President; J. H. Landis, Treasurer.

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Company, Columbia, Lancaster county. Two stacks: one, 61 x 13 $\frac{1}{2}$, built in 1854; remodeled in 1881; and one, 45 x 17, built in 1868; a third stack, (No. 1), now abandoned, was built in 1845; closed tops; fuel, anthracite coal and coke; ores, Chestnut Hill and Ebbvale (Maryland) hematite, with $\frac{1}{8}$ red-short magnetite; specialty, foundry pig iron; total annual capacity, 30,000 net tons. Brands, "Chestnut Hill 2" and "Chestnut Hill 3." A large new modern furnace is contemplated, to take the place of the abandoned No. 1. Main office, 52 Wall st., New York. B. G. Clarke, President, and Charles E. Sturgis, Treasurer. Works at Columbia. Jerome L. Boyer, General Manager. *See Rolling Mills.*

Chickies Furnaces, Chickies Iron Company, (successors to E. Haldeman & Co.,) Chickies, Lancaster county. Two stacks: No. 1, 45 x 11½, built in 1845; No. 2, 45 x 12, built in 1854; two iron hot-blast stoves; closed tops; fuel, ¾ anthracite coal and ¼ coke; ores, magnetic from Cornwall, Lebanon county, Chestnut Hill brown hematite from Silver Spring, Lancaster county, and specular; product, foundry and mill pig iron. Brand, "Chickies." Paris Haldeman, President; Horace L. Haldeman, Secretary and Treasurer. Selling agents, Justice Cox, Jr., & Co., Philadelphia; R. C. Hoffman & Co., Baltimore; J. Reamer, Pittsburgh; and John H. Thompson & Co., New York.

Colebrook and Cornwall Anthracite Furnaces, Robert H. Coleman, Lebanon, Lebanon county. Three completed stacks, and one stack building at Cornwall. Colebrook Furnaces, at Lebanon; No. 1, 55 x 14½, completed in November, 1881, has made 626 gross tons of pig iron per week on all Cornwall ore; No. 2, 80 x 14½, completed in November, 1882, has made 715 gross tons of pig iron per week on all Cornwall ore. Cornwall Anthracite Furnace, at Cornwall, Hugh M. Maxwell, Manager; one stack, 38 x 12, built in 1854. Use Cornwall ore exclusively. An entirely new plant of two large stacks is contemplated at Cornwall, and one of the stacks is partly under way.

Conestoga Furnace, Peacock & Thomas, Lancaster, Lancaster county. Philadelphia office, 242 South Third st. One stack, 38 x 10½, built in 1846, and remodeled in 1872; closed top; ores, Lancaster county hemattites exclusively; specialty, neutral foundry pig iron, known as "Conestoga" iron; annual capacity, 6,500 net tons. Selling agent, E. Bertolet, Philadelphia.

Conewago Furnace, Conewago Iron Company, Middletown, Dauphin county. Formerly called Middletown Furnace. One stack, 45 x 11, built in 1853, and enlarged since then; makes "Chickies" brand of pig iron exclusively for the Chickies Iron Company. Paris Haldeman, President; Henry B. Grubb, Vice-President; Horace L. Haldeman, Treasurer; Frank Nisley, Secretary. Selling agents, Justice Cox, Jr., & Co., Philadelphia; J. Reamer, Pittsburgh; R. C. Hoffman & Co., Baltimore; John H. Thompson & Co., New York.

Cordelia Furnace, Cordelia Iron Company, Cordelia, near Columbia, Lancaster county. Formerly called Kauffman Furnace. One stack, 38 x 12, built in 1848, and rebuilt in 1859; one iron-pipe hot-blast stove; open top; ores, hematite and magnetic from Pennsylvania, Maryland, and New Jersey; specialty, mill pig iron; annual capacity, 8,000 net tons. Brand, "Cordelia." H. A. Muhlenberg, President; A. A. McHose, Secretary; Isaac McHose, Treasurer and General Manager.

Donegal Furnace, Benson & Cottrell, Columbia, Lancaster county. Furnace at Vesta, near Marietta. One stack, 36 x 12, built in 1848; open top; annual capacity, 6,500 net tons.

Katherine Furnace, C. W. Ahl & Son, Carlisle, Cumberland county. Works at Boiling Springs. One stack, 50 x 11, built in 1881-2; closed top; iron jacket; Weimer hot blast; fuel, ½ anthracite coal and ½ coke;

ore, local brown hematite ; product, forge pig iron. Brand, "Carlisle." *See Charcoal Furnaces. See Bloomaries.*

Lebanon Furnaces, Arthur and Horace Brock, Lebanon, Lebanon county. Two stacks : one 50 x 13, built in 1846, reconstructed in 1868 ; the other, 65 x 17, built in 1872-3, put in blast in August, 1873 ; both stacks remodeled in 1883 ; one Whitwell fire-brick and one iron hot-blast stove ; fuel, anthracite coal and coke ; ore, Cornwall ; product, Bessemer pig iron ; a third stack, 36 x 12, built in 1847, was torn down to rebuild, but work on it has been discontinued. The combined capacity of the two furnaces in operation is about 1,000 net tons a week.

Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 60 x 13, built in 1867 ; blown in December 23, 1867 ; remodeled in 1884 ; bell-and-hopper top ; Whitwell fire-brick hot-blast stoves ; fuel, anthracite coal and coke ; ores, Cornwall and hematite ; specialty, gray forge red-short pig iron ; annual capacity, 12,000 net tons. Brand, "Lebanon Valley." *See Bloomaries.*

Lochiel Furnace, Lochiel Rolling Mill Company, Harrisburg, Dauphin county. One stack, 52 x 14, built in 1873 ; put in blast in April, 1873 ; closed top ; annual capacity, 7,500 net tons. Will be remodeled in 1884.

Marietta Furnaces, Henry M. Watts & Son, Marietta, Lancaster county. Two stacks : one, 50 x 12½, built in 1847, and remodeled in 1880 ; and one, 38 x 12, built in 1849 ; closed tops, with bell and hopper ; fuel, anthracite coal and Connellsville coke ; ores, Cornwall and limonite of superior quality ; special product, neutral gray forge pig iron, used for boiler and flange iron ; total annual capacity, 12,000 net tons.

Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two stacks, 52 x 13 and 60 x 14, built in 1855 and 1872, respectively ; five Whitwell fire-brick stoves ; closed tops ; fuel, ¾ anthracite coal and ¼ coke ; ores, Pennsylvania magnetic and brown hematite, and some foreign ; product, mill pig iron ; total annual capacity, 40,000 net tons.

Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Five stacks : No. 1, 60 x 14, built in 1872-3, and put in blast in October, 1873 ; remodeled in 1883 ; blast heated at present with iron stoves, but two Whitwell stoves are in course of construction. No. 2, 76 x 20, built in 1874-6 ; put in blast in June, 1876 ; remodeled in 1877 and supplied with three Whitwell stoves. Nos. 3 and 4, each 70 x 18 ; No. 3 first put in operation in February, 1884, and No. 4 first put in operation in April, 1884 ; each has three Whitwell stoves. No. 5, 55 x 11, built in 1873-4, and remodeled in 1882 ; buildings destroyed by fire in November, 1883, and rebuilt ; iron stoves. Fuel, coke and anthracite coal mixed ; ores, foreign and domestic hematite and magnetic ; specialty, Bessemer pig iron ; total annual capacity, 200,000 net tons. *See Rolling Mills.*

Richmond Furnace, Southern Pennsylvania Railroad and Iron and Mining Company, Richmond Furnace, Franklin county. Formerly called Mount Pleasant Iron Works. One stack, 36 x 9½, built in 1865,

- and rebuilt in 1875; open top; fuel, anthracite and coke; ores from the Richmond mines, two miles from the furnace; annual capacity, 5,500 net tons. T. B. Kennedy, Manager, Chambersburg.
- Stanhope Furnace, Francis H. Garrett, lessee, Pottsville. Furnace at Pine Grove, Schuylkill county. One stack, 33 x 10, built in 1825; bell-and-hopper top; annual capacity, 5,200 net tons.
- St. Charles Furnaces, C. B. Grubb & Son, Lancaster, Lancaster county. Works at Columbia. Two stacks: No. 1, 52 x 14, built in 1853; the other, formerly known as the Henry Clay, 57 x 12, built in 1845, is now the St. Charles Furnace No. 2; remodeled in 1879 and 1880; closed tops; fuel, anthracite coal and coke; ores, Cornwall, Chestnut Hill, and Conestoga; product, pig iron which is well known as exceptional for its quality for boiler plate, bars, nails, or foundry work; total annual capacity, 20,000 net tons. Brand, "Grubb." Charles B. Grubb, Secretary and Treasurer; Joseph Eckman, Superintendent.
- Swatara Furnace, Denney, Watts & Co. Limited, lessees, Harrisburg. Furnace at Union Deposit, Dauphin county. One stack, 50 x 11, built in 1854, and remodeled in 1880; iron hot-blast stoves; closed top; fuel, anthracite coal and coke; ores, magnetic, brown hematite, and fossil, from Lebanon, Dauphin, and Juniata counties; product, gray forge pig iron; annual capacity, 8,000 net tons. Brand, "Swatara." Formerly called Union Deposit Furnace. D. Watts, Secretary and Treasurer; John Q. Denney, Superintendent.
- Vesta Furnace, Watts, Twells & Co. Limited, Vesta, Lancaster county. Formerly called Musselman Furnace. One stack, 60 x 14, built in 1868; rebuilt in 1881; iron stack on iron pillars; two large iron hot-blast stoves; bell-and-hopper top; fuel, anthracite coal and coke; ores, hematite and magnetic, from New Jersey and from Cumberland county and Cornwall, Pennsylvania; special products, neutral forge metal and superior foundry iron; annual capacity, 15,000 net tons. John Steel Twells, Chairman; Ethelbert Watts, Secretary, Treasurer, and Manager. Philadelphia office, 220 South Third st.
- Number of furnaces in the Lower Susquehanna region: 37 completed anthracite stacks, and 1 stack building.

SHENANGO VALLEY—BITUMINOUS COAL OR COKE.

- Douglas Furnaces, Pierce, Kelly & Co., Sharpsville, Mercer county. Two stacks: one stack, 60 x 15, built in 1870, and put in blast in March, 1871; rebuilt and enlarged in 1879; the other stack, 60 x 16, built in 1872, put in blast in February, 1873, and enlarged in 1881; closed tops; fuel, Mercer county block coal and coke; ore, Lake Superior; specialty, pig iron for Bessemer and Siemens-Martin steel; combined annual capacity, 50,000 net tons. Brand, "Douglas."
- Ella Furnace, Boyce, Wheeler & Co., Sharon, Mercer county. Furnace at West Middlesex, occupying the site of the two Shenango Furnaces, which were built in 1859 and torn down in 1882. One stack, 70 x 15, built in 1882; closed top; fuel, Connellsville coke and Mercer county

- block coal; ore, Lake Superior; product, foundry pig iron; annual capacity, 28,000 net tons. Brand, "Ella." E. A. Wheeler, Manager.
- Etna Furnaces, Etna Iron Works Limited, New Castle, Lawrence county. One stack, 75 x 16, built in 1882-3, to replace two stacks built in 1868, which were torn down in 1882; fuel, raw coal and coke; ores, Lake Superior and native; specialty, gray forge pig iron; annual capacity, 36,000 net tons. *See Rolling Mills.*
- Fannie Furnace, Wheeler Iron Company, Sharon. Works at West Middlesex, Mercer county. One stack, 51½ x 13½, built in 1873; put in blast October 13, 1873; fuel, raw coal and coke; ore, Lake Superior; product, principally Bessemer pig iron; annual capacity, 14,000 net tons. Brand, "Fannie." E. A. Wheeler, Manager. *See Rolling Mills.*
- Henderson Furnace, Henderson, Forker & Co., Sharpsville, Mercer county. One stack, 60 x 12, built in 1868; put in operation in October, 1868; remodeled in 1882; ore, Lake Superior; product, Bessemer, foundry, and mill pig iron; annual capacity, 15,000 net tons. Formerly called Allen Furnace.
- Keel Ridge Furnace, P. L. Kimberly & Co., Sharon, Mercer county. One stack, 55 x 13½, built in 1869; fuel, raw coal and coke; ore, Lake Superior; product, principally No. 1 mill iron; annual capacity, 12,000 net tons. *See Rolling Mills.*
- Mabel Furnaces, Perkins & Co. Limited, Sharpsville, Mercer county. Two stacks: one, 65 x 14, built in 1872, and rebuilt in 1883, not yet put in blast; and one, 50 x 14, built in 1880; closed tops; fuel, block coal and coke; ore, Lake Superior; product, foundry and Bessemer pig iron; annual capacity of the first stack, 28,000 net tons, of the second, 22,000 net tons. Brand, "Mabel." S. Perkins, Jr., Manager.
- Mount Hickory Iron Company Limited, Erie. Works at Sharpsville, Mercer county. Two stacks, each 50 x 12, built in 1869; closed tops; ore, Lake Superior; product, foundry and forge pig iron; combined annual capacity, 30,000 net tons. *See Rolling Mills.*
- Neshannock Furnace, Crawford Iron and Steel Company, New Castle, Lawrence county. One stack, 78 x 17, built in 1872; first put in operation December 1, 1872; remodeled in 1883; closed top; three Whitwell stoves, each 60 x 17; fuel, coke; ore, Lake Superior; product, foundry and mill pig iron; annual capacity, 50,000 net tons. A. L. Crawford, President; Wm. Patterson, Vice-President; John L. Crawford, Secretary; Joseph A. Crawford, Treasurer; W. E. Reis, Manager.
- Raney & Berger, New Castle, Lawrence county. One stack, 60 x 16, built in 1872; put in blast in May, 1872; three iron-pipe hot-blast stoves; closed top; fuel, coke; ore, Lake Superior; product, "Hecla" and "Norway" foundry and Bessemer pig iron; annual capacity, 40,000 net tons.
- Rosena Furnace, Rhodes & Co., lessees, Cleveland, Ohio. Furnace at New Castle, Lawrence county. One stack, 77 x 20, built in 1872, and first put in blast in June, 1873; five Player hot-blast stoves; closed top; fuel, coke; ore, Lake Superior; product, foundry pig iron; ca-

capacity, 36,000 net tons. Brand, "Rosena." A. M. Robbins, Superintendent.

Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer county. One stack, 60 x 12, built in 1845, and rebuilt in 1882; three iron hot-blast stoves; closed top; fuel, Connellsville coke, with a small proportion of local bituminous coal; ore, Lake Superior hematite; product, foundry and forge pig iron; annual capacity, 20,000 net tons. Brand, "Sharon." Norman Hall, Secretary, Treasurer, and Superintendent. Selling agents, Nimick & Co., Pittsburgh; J. Traber & Co., Cincinnati.

Sharpsville Furnace, Sharpsville Iron Company, Sharpsville, Mercer county. One stone stack, built in 1847, and torn down commencing January 1, 1882, and a new iron stack, 65 x 13, built, and blown in October 15, 1882; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; annual capacity, 9,000 net tons. Brand, "Sharpsville." James B. Pierce, managing partner.

Spearman Furnaces, Spearman Iron Company, Sharpsville, Mercer county. Two stacks, each 63 x 14, built in 1872; blown in January 15, 1873, and September 20, 1875; remodeled in 1883; closed tops; fuel, raw coal and coke; ore, Lake Superior; product, Bessemer, foundry, and red-short mill pig iron; combined annual capacity, 60,000 net tons. Brand, "Spearman." J. J. Spearman, Manager.

Stewart Furnaces, Stewart Iron Company Limited, Sharon, Mercer county. Two stacks: No. 1, 66 x 13, built in 1870, and enlarged in 1882; No. 2, 70 x 14, built in 1872, and enlarged in 1883; closed tops; four iron hot-blast stoves; fuel, Connellsville coke; ore, Lake Superior; product, strictly Bessemer pig iron; combined annual capacity, 62,000 net tons. Formerly called Valley Furnaces. S. McClure, Agent; Fayette Brown, General Agent, Cleveland, Ohio. *See Rolling Mills.*

Wampum Furnace, Wampum, Lawrence county. One stack, 50 x 12, built in 1856; bell-and-hopper top; fuel, coke, half of which is made from coal mined near the furnace; ores, Lake Superior, native red limestone, and mill cinder; annual capacity, 7,000 net tons. Has been idle since the failure of the Wampum Iron Company in 1883.

Westerman Furnaces, C. H. Buhl, Sharon, Mercer county. Two stacks: one, 48 x 14, built in 1865; and one, 72 x 14, built in 1866, and enlarged in 1883; closed tops; fuel, raw coal and Connellsville coke; ore, Lake Superior; specialty, No. 1 mill pig iron; combined annual capacity, 40,000 net tons. Brand, "Westerman." *See Rolling Mills.*

Wheatland Furnaces, Wheatland Bessemer Steel Company, Wheatland, Mercer county. Four stacks, built from 1860 to 1865; one 46 x 9 and three 46 x 12; combined annual capacity, 30,000 net tons. Out of blast since September, 1875. *See Rolling Mills.*

Number of furnaces in the Shenango region: 27 raw coal or coke stacks.

ALLEGHENY COUNTY—COKE.

Carrie Furnace, Pittsburgh Furnace Company, Pittsburgh. Furnace at Rankin Station, Allegheny county, on the line of the Baltimore and

Ohio Railroad. One stack, 70 x 18, removed from Ohio in 1883; blown in February 29, 1884; ore, Lake Superior; product, mill pig iron; estimated annual capacity, 40,000 net tons.

Clinton Furnace, Graff, Bennett & Co., Pittsburgh. One stack, 45 x 12, built in 1859; ores, principally Lake Superior, and remainder native; annual product, 12,000 net tons. *See Rolling Mills.*

Edgar Thomson Furnaces, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Five stacks: Furnace A, 65 x 13, built in 1879, has 3 Siemens-Cowper-Cochrane stoves, each 55 x 15, and 1 Whitwell stove, 65 x 15. Furnaces B and C, each 80 x 20, built in 1880, have 6 Siemens-Cowper-Cochrane stoves, each 60 x 20, and 2 Whitwell stoves, each 75 x 21. These three furnaces have 8 cut-off condensing engines, of the Mackintosh, Hemphill & Co. type, with blowing cylinders 84 in. x 48 in., and steam cylinders 32 in. x 48 in. Furnaces D and E, each 85 x 20, built in 1881, have 6 Siemens-Cowper-Cochrane stoves of an improved type, each 72 x 21, 6 cut-off condensing engines, built by Robinson, Rea & Co., with blowing cylinders 35 in. x 48 in., and one Mackintosh, Hemphill & Co. blowing engine, 36 in. x 48 in. There are also 6 Worthington pumping engines, of 20,000,000 gallons daily capacity, 6 Worthington duplex pumps, 52 steel boilers, and 2 pneumatic and 3 Otis steam hoists. Fuel, Connellsville coke; ores, Pennsylvania, Lake Superior, and foreign; product, Bessemer pig iron; combined annual capacity, about 250,000 net tons. J. H. Cremer, Superintendent of furnaces. *See Rolling Mills.*

Edith Furnace, Manchester Iron and Steel Company, Henry Stanton, Assignee, 32 and 34 Nassau st., New York. Furnace at Pittsburgh. One stack, 70 x 16, built in 1882 on the site of the two stacks built in 1862-3; first put in operation in November, 1882; closed top; four fire-brick hot-blast stoves; fuel, Connellsville coke; ore, Lake Superior; product, gray forge pig iron; daily capacity, 100 net tons. Formerly called Superior Iron Company.

Eliza Furnaces, Laughlin & Co. Limited, Pittsburgh. Two stacks, built in 1861; originally 45 x 12, but in 1873 and 1874 they were enlarged, and No. 1 is now 61 x 16, while No. 2 is 61 x 14; closed tops; fuel, coke; ore, Lake Superior; specialty, mill pig iron; total annual capacity, 55,000 net tons. Brand, "Eliza." Henry A. Laughlin, Chairman; James Laughlin, Jr., Secretary and Treasurer.

Isabella Furnaces, Isabella Furnace Company, Etna, Allegheny county. Two stacks, each 75 x 20, built in 1872; each stack supplied with three 70 x 21 Whitwell stoves; closed tops; ore, Lake Superior; product, foundry and mill pig iron; total annual capacity, about 150,000 net tons. Hugh Kennedy, Manager.

Lucy Furnaces, Lucy Furnace Company Limited, Pittsburgh. Two stacks, each 75 x 20; No. 1 first put in blast in May, 1872, and No. 2 first put in blast September 27, 1877; six Whitwell hot-blast fire-brick stoves; blowing equipment, 6 vertical engines, with blowing cylinders

48 in. x 84 in. ; fuel, Connellsville coke ; ores, principally from Michigan and Wisconsin ; product, Bessemer, forge, and foundry pig iron ; aggregate annual capacity, about 100,000 net tons. Brand, "Lucy." Edward A. Macrum, Chairman ; John Walker, Secretary and Treasurer ; Julian Kennedy, Superintendent.

Shoenberger Furnaces, Shoenberger, Speer & Co., Pittsburgh. One completed stack, 62 x 13½, built in 1865 ; closed top ; fuel, coke ; ores, Lake Superior, native, and foreign ; product, Bessemer, foundry, and gray forge pig iron ; annual capacity, 25,000 net tons. One stack, built in 1865, torn down in 1884, and being rebuilt to 62 x 14.

Soho Furnace, Moorhead, McCleane & Co., Pittsburgh. One stack, 67 x 18, built in 1872 ; put in blast November 22, 1872 ; fuel, coke ; ore, Lake Superior ; specialty, Bessemer pig iron ; annual capacity, 45,000 net tons. Brand, "Soho."

Number of furnaces in Allegheny county : 16 completed coke stacks, and 1 stack building.

RAW BITUMINOUS COAL OR COKE—MISCELLANEOUS.

Allegheny Furnace, S. C. Baker, Altoona, Blair county. One stack, 32 x 9, built in 1811 ; fuel, coke.

Blair Iron and Coal Company, Hollidaysburg, Blair county. General office, 218 South Fourth st., Philadelphia. Four stacks, all in Blair county : Bennington Furnace, at Bennington, 41 x 9½, built in 1856 ; No. 1, at Hollidaysburg, 59 x 14, built in 1856, and rebuilt in 1883-4 ; No. 2, at Hollidaysburg, 51 x 11, built in 1856 ; and Frankstown Furnace, at Frankstown, 45 x 10, built in 1836 ; rebuilt in 1872. All use coke ; closed tops ; ores, local hematite from Springfield and Bloomfield, Lake Superior, and foreign ; product, Bessemer pig iron ; combined annual capacity, 45,000 net tons. John W. Townsend, President, Philadelphia ; W. S. Robinson, Secretary and Treasurer, Philadelphia ; E. R. Baldrige, Superintendent, Hollidaysburg ; P. E. Chapin, General Manager, Johnstown. *See Rolling Mills.*

Cambria Iron Works, Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Seven stacks ; fuel, coke. Six of these stacks are at Johnstown, and one is at East Conemaugh, two miles from Johnstown. Of the stacks at Johnstown four were built in 1853 and 1854 ; Nos. 1 and 2 were rebuilt in 1883, and are each 75 x 16 ; Nos. 3 and 4 are each 68½ x 13½ ; the fifth, 78 x 19½, called Centennial Furnace, was built in 1873-6, and blown in December 22, 1876 ; the sixth is 78 x 19½, and was blown in July 20, 1879. Ores, brown hematite from Blair county, Pa., and red hematite from Lake Superior. Specialty, Bessemer pig iron. The stack at East Conemaugh is 60 x 11½, was built in 1857, and is now making spiegeleisen from a mixture of foreign and domestic ores. Total annual capacity, 210,000 net tons. The furnaces of the Blair Iron and Coal Company, which are practically under the same management, add 45,000 net tons to this capacity, making the total 255,000 net tons. *See Rolling Mills.*

Charlotte Furnace Company, Scottdale, Westmoreland county. Pittsburgh office, Room 27, Lewis Building. One stack, 65 x 16½, built in 1872-3; put in blast October 14, 1873; closed top; fuel, coke; ores, Lake Superior, hematite from Blair and Huntingdon counties, Cornwall ore from Lebanon county, and carbonate from Fayette county; specialty, mill pig iron; annual capacity, 22,000 net tons. Brand, "Charlotte." Selling agents, Nimick & Co., Pittsburgh.

Chester Rolling Mills, Thurlow, Delaware county. One stack, 70 x 18, first put in blast in November, 1881; stack at present lined up to 16 feet across the bosh; three 60 x 18 Whitwell hot-blast stoves; closed top; fuel, Connellsville coke; ores, foreign; specialty, Bessemer pig iron; annual capacity, 40,000 net tons. *See Rolling Mills.*

Dunbar Furnaces, Dunbar Furnace Company, Dunbar, Fayette county. Two stacks. Furnace No. 1, 77 x 19½, built in 1790, rebuilt in 1870, rebuilt in 1876, and rebuilt to present size in 1880; four Whitwell hot-blast stoves—three 40 x 18, and one 40 x 22. Furnace No. 2, 78 x 19½, first put in blast in May, 1880, banked down June 1, 1881, and blast again put on without blowing out on October 26, 1881; two Whitwell stoves, 60 x 18. Fuel, Connellsville coke; closed tops; ores, a large percentage of Lake Superior specular mixed with roasted native carbonates, with a small quantity of mill cinder to insure free working; product, mill and foundry pig iron, strong and of dark color; total annual capacity, 52,000 net tons. Old stack was called "Union." Charles Parrish, President, Wilkesbarre; Harry W. Hazard, Secretary, Treasurer, and Superintendent, Dunbar; Charles H. Kimball, Cashier, Dunbar; A. H. Childs, Agent, Pittsburgh.

Elizabeth Furnace, John Whitehead, Sabbath Rest, Blair county. One stack, 32 x 9, built in 1832; fuel, coke; estimated annual capacity, 3,000 net tons.

Emma Furnace, Logan Iron and Steel Company, Lewistown, Mifflin county. Philadelphia office, 218 South Fourth st. One stack, 42 x 9, built in 1867; formerly operated with charcoal, but enlarged in 1879 to be run with coke; closed top; ores, local brown hematite, carbonate, and red fossiliferous; product, gray forge pig iron; annual production, 4,400 net tons. *See Greenwood (charcoal) Furnaces. See Rolling Mills.*

Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, 55 x 13½, built in 1869, enlarged in 1879; two hot-blast stoves; fuel, Connellsville coke and Shenango Valley bituminous coal; ore, mostly Lake Superior; product, foundry pig iron; annual capacity, 14,000 net tons. Theodore F. Noble, Superintendent.

Everett Iron Company, Everett, Bedford county. One stack, 75 x 16, commenced March 23, 1883, and completed in 1884; closed top; three Siemens-Cowper-Cochrane hot-blast stoves; fuel, Broad Top coke; ores, local fossil and hematite; James P. Kimball, President; Henry N. Brinsmade, Vice-President and Superintendent; John Clinton Gray, Secretary; H. M. Braem, Treasurer.

Fairchance Furnace, Fairchance Furnace Company, Fairchance, Fayette county. One stack, 44 x 12, built in 1794, and rebuilt in 1871; fuel, coke; ores, native carbonates, varying from 30 to 50 per cent.; all stock mined on the property; annual capacity, 10,000 net tons. J. D. Lyon, President; W. H. DeForest, Jr., Secretary and Treasurer, 466 Broome st., New York; R. L. Martin, General Superintendent, Fairchance, Pa.

Gap Furnace, Hollidaysburg and Gap Iron Company, Hollidaysburg. Furnace at McKee, Blair county. One stack, 46½ x 10, built in 1840, and remodeled in 1877; fuel, coke; closed top; annual capacity, 5,000 net tons. James Denniston, President; James M. Hewit, Secretary and Treasurer.

Juniata Furnace, James M. Kinkead, Williamsburg, Blair county. One stack, 28 x 8½, built in 1857. Has been out of blast for several years. Property for sale or lease.

Kemble Furnaces, Kemble Coal and Iron Company, Riddlesburg, Bedford county. General office, 20 Nassau st., P. O. Box 157, New York. Two stacks, 60 x 14 and 60 x 15, built in 1869 and 1870; the first was put in blast July 4, 1869, and the second March 4, 1871; four Player hot-blast stoves; closed tops; fuel, coke from washed coal; ores, local fossil and hematite; product, principally a soft, strong, fluid, foundry pig iron, with special capacity for absorbing scrap; total annual capacity, 25,000 net tons. Brand, "Kemble." Peter P. Parrott, President, New York; R. A. Wight, Secretary and Treasurer, New York; William Lauder, General Manager, Riddlesburg; William Kelly, Furnace Superintendent.

Lemont Furnace, R. Hogsett & Co., Lemont Furnace P. O., Fayette county. One stack, 65 x 15, built in 1875; put in blast in January, 1876; three Player hot-blast stoves; closed top; fuel, coke; ores, all obtained on the furnace land; product, forge and foundry pig iron; annual capacity, 14,000 net tons. Brand, "Lemont." R. Hogsett, Treasurer. Selling agent, W. E. Beall, Pittsburgh.

Lucy Furnace, Whitehead & Swoope, Mount Union, Huntingdon county. Formerly called Matilda Furnace. One stack, 42½ x 10, built in 1837, and rebuilt in 1869; one hot-blast stove; closed top; fuel, Latrobe and Connellsville coke; ores, fossil and Juniata Valley hematite; product, gray forge pig iron; annual capacity, 4,000 net tons. John Whitehead, Treasurer; G. W. R. Swoope, Superintendent. Main office, Huntingdon.

Mahoning Furnace, Wesley Wilson, lessee, Mahoning Furnace, Armstrong county. One stack, 40 x 11, built in 1845; one iron hot-blast stove; closed top; fuel, coke; ore, local limonite; annual capacity, 5,000 net tons. The ore, coal for coking, and limestone are all obtained in the immediate vicinity of the furnace. The pig iron produced is No. 1 gray forge, of cold-short tendency, yet very strong. Some extra quality No. 1 foundry pig iron is also produced.

Niagara Furnace, Haines, Stephenson & Co., Mill Hall, Clinton county.

One stack, 32 x 10, built in 1830, abandoned in 1857, and revived in 1880. Formerly called Mill Hall Furnace.

Oliphant Furnace, Fayette Coke and Furnace Company, Oliphant Furnace, Fayette county. One stack, 50 x 11, built in 1875-6; one iron hot-blast stove; closed top; fuel, coke; ores, local carbonate, mill cinder, Blair county, and Lake Superior; product, mill pig iron; annual capacity, 9,000 net tons. A. W. Bliss, President and Treasurer, Uniontown; A. B. de Saulles, Superintendent, Oliphant Furnace; A. H. Childs, selling agent, Pittsburgh.

Pennsylvania Furnace, Centre Mining Company Limited, Pennsylvania Furnace, Huntingdon county. One stack, 43 x 11, built in 1813; changed from charcoal to coke in 1881; two Player and Ford hot-blast stoves; closed top; fuel, Connellsville coke; pipe ore from furnace property; product, forge pig iron; annual capacity, 10,000 net tons. S. A. Clarke, Chairman, Pittsburgh; James McKnight, Secretary, Treasurer, and Superintendent. E. M. Valentine, 261 South Fourth st., Philadelphia, sole sales agent.

Powelton Furnace, Robert Hare Powel's Sons & Co., 419 Walnut st., Philadelphia. Furnace at Saxton, Bedford county. One stack, 70 x 18, built in 1880-1, and blown in October 16, 1882; fuel, Broad Top coke; three 70 x 18 Whitwell fire-brick stoves; product, No. 1 foundry pig iron; annual capacity, 25,000 net tons. Building a second stack.

Rebecca Furnace, Kittanning Iron Company Limited, Kittanning, Armstrong county. One stack, 65 x 16, first put in blast June 20, 1880; fuel, coke; closed top; ores, native and Lake Superior; product, forge and foundry pig iron; annual capacity, 25,000 net tons. Brands, "Kittanning" and "Rebecca." *See Rolling Mills.*

Red Bank Furnace, Alex. Reynolds' Sons, Red Bank Furnace, Clarion county. One stack, 42 x 11½, built in 1859; closed top; fuel, coke; limestone ore, mined on the furnace land; specialty, cold-short mill pig iron; annual capacity, 7,800 net tons. David Reynolds, Manager.

Rockhill Furnaces, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Office, 320 Walnut st., Philadelphia. Two stacks, 65 x 17½ and 65 x 17, built in 1875, and blown in January 1, 1876; four Kent hot-blast stoves; closed tops; fuel, 70 per cent. Rockhill and 30 per cent. Connellsville coke; ores, ¼ soft fossil, ½ hematite, and ¼ hard fossil; soft fossil ore mainly from the company's mines, hematite from the company's mines and Spruce Creek Valley, and hard fossil from Frankstown and Bedford; specialty, gray forge pig iron; total annual capacity, 30,000 net tons. Brand, "Rockhill." Wm. A. Ingham, President; Edward Roberts, Jr., Vice-President; Wm. Boyd Jacobs, Secretary and Treasurer; Alfred W. Sims, Manager.

Rodman Furnaces, Duncan heirs, Roaring Springs, Blair county. Two stacks, 61 x 14 and 43 x 10, built in 1846, and rebuilt in 1879-80; Player hot-blast stoves; closed tops; fuel, coke; ore, native brown hematite; total annual capacity, 26,000 net tons.

Stewardson Furnace, F. B. & A. Laughlin, P. O. Box 259, Pittsburgh.

Furnace at Mahoning, Armstrong county. One stack, $43\frac{1}{2} \times 11$, built in 1851; open top; fuel, coke; ores, native blue and red limestone; product, cold-short pig iron; annual capacity, 4,000 net tons.

Number of raw coal or coke furnaces outside of Allegheny county and the Shenango region: 39 completed stacks, and one stack building.

CHARCOAL—STATE.

Barree Furnace, J. W. Mumper & Co., Barree Forge, Huntingdon county. One stack, 33×9 , built in 1863; hot blast; bell-and-hopper top; water-power; specialty, forge pig iron; annual capacity, 3,600 net tons. *See Bloomaries.*

Berlin Iron Works, Jackson Iron Company, Berwick, Columbia county. Furnace at Glen Iron, Union county. One stack, 35×8 , built in 1827; abandoned in 1856; revived in July, 1880; cold blast; closed top; ores, hematite and fossil; product, car-wheel and malleable pig iron; annual capacity, 4,000 net tons.

Carlisle Iron Works, C. W. Ahl & Son, Carlisle. Works at Boiling Springs, Cumberland county. One stack, $28 \times 8\frac{1}{2}$, built in 1798, and rebuilt in 1815; hot blast; closed top; water-power; ore, Cumberland county hematite; specialties, neutral forge pig iron and car-wheel iron; annual capacity, 5,000 net tons. Brand, "Carlisle." *See Lower Susquehanna Furnaces. See Bloomaries.*

Carrick Furnace, Bland & Spang, Metal, Franklin county. One stack, 37×9 , built in 1828, and remodeled in 1880; cold blast; ore, local hematite; product, first-class car-wheel pig iron; annual capacity, 2,800 net tons. Newton Jones, Assistant Superintendent.

Chestnut Grove Furnace, operated by "Chestnut Grove Furnace," Idaville, Adams county. One stack, $32 \times 8\frac{1}{2}$, built in 1830; cold blast; open top; ores, hematite and magnetic; product, car-wheel pig iron; annual capacity, 1,600 net tons. Owners, James Rick and E. D. Weit-zell, of Reading, and H. D. Markley, of Idaville.

Cleversburg Furnace, L. M. Gochnauer & Co., Shippensburg, Cumberland county. One stack, 35×8 , built in 1881, and remodeled in 1882; cold blast; closed top; ores, local limestone and hematite; product, car-wheel pig iron; daily capacity, 6 tons. R. Blickenderfer, Secretary and Treasurer, Lancaster; L. M. Gochnauer, Manager, at the furnace.

Cornwall Charcoal Furnace, R. W. Coleman's heirs, Cornwall, Lebanon county. One stack, 31×8 , built in 1742; cold blast. W. C. Freeman, General Manager. *See Lower Susquehanna Furnaces.*

Eagle Furnace, Curtins & Co., Roland, Centre county. One stack, 28×8 , built in 1848; open top, open hearth, and closed tuyere; ore, Nittany Valley brown hematite; cold blast; water-power; annual capacity, 2,200 net tons. All the pig iron made is turned into billets for rods, shovels, sheet iron, and boiler plate. The original furnace was built in 1817, half a mile south of the present site. In 1836 another furnace was built 16 miles west; in 1848 it was abandoned and the present furnace was built. *See Rolling Mills. See Bloomaries.*

East Penn Furnace, John Balliet, Parryville, Carbon county. One stack, 28 x 7½, built in 1837; cold blast; water-power.

Falling Spring Furnace, C. Burkhardt & Co., Chambersburg, Franklin county. One stack, 40 x 8½, built in 1880, and remodeled in 1883-4; closed top; cold blast; ore, local hematite; 'specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Falling Spring."

Greenwood Furnaces, Logan Iron and Steel Company, Lewistown, Mifflin county. Works at Greenwood, Huntingdon county. Philadelphia office, 218 South Fourth st. Two stacks, each 32 x 9, built in 1833 and 1864, respectively; open tops; cold blast; red fossiliferous ore, obtained in the vicinity of the furnaces; pig iron used for car-wheels and chilled rolls; total annual capacity, 5,000 net tons. *See Emma (coke) Furnace. See Rolling Mills.*

Hampton Furnace, E. and G. Brooke Iron Company, Birdsboro, Berks county. One stack, 30 x 8, built in 1846, and rebuilt in 1872; closed top; cold blast; ore, principally hematite, obtained in the vicinity of the furnace; product, car-wheel iron; capacity, 1,500 net tons. *See Schuylkill Valley Furnaces. See Rolling Mills.*

Hecla Furnace, McCoy & Linn, Milesburg, Centre county. One stack, 32 x 8½, built in 1864; cold blast; water-power; open top; ore, hematite, from Nittany Valley; specialty, forge pig iron; entire product used in the forge and rolling mill of the firm; annual capacity, 2,000 net tons. Old Hecla Furnace, built in 1820, was abandoned in 1864. *See Rolling Mills. See Bloomaries.*

Hope Furnace, Joseph L. Brown & Co., Pittsburgh. Furnace at Rose Point, Lawrence county. One stack, 28 x 8, built in 1868; cold blast. The ore and limestone are mined only 200 yards from the furnace. The furnace has been out of blast for the past two years.

Hopewell Furnace, Edward S. Buckley, 209 South Third st., Philadelphia. Furnace near Monocacy, Berks county. One stack, 30 x 7, built in 1759, and rebuilt in 1800; cold blast; water and steam power; ores, hematite and magnetic, obtained in the neighborhood; product, car-wheel pig iron; annual capacity, 1,200 net tons. H. A. Long, Manager. *See Rolling Mills in Philadelphia.*

Hopewell Furnace, James Eichelberger & Co., Hopewell, Bedford county. Heberton & Co., agents, 220 South Third st., Philadelphia. One stack, 30 x 8½, built in 1800; warm blast; open top; water-power; ores, hematite and fossil; specialty, car-wheel pig iron; annual capacity, 1,600 net tons. Put in blast in 1881, after several years' idleness. *See Bloomaries.*

Howard Furnace, Bernard Lauth, Howard, Centre county. One stack, 31 x 8½, built in 1833; cold blast; water-power; ore, local hematite; product, car-wheel iron; annual capacity, 2,500 net tons. One stack, 33 x 8, built in 1830, torn down in 1883. *See Rolling Mills. See Bloomaries.*

Isabella Furnace, Joseph D. Potts, Barneston, Chester county. Philadelphia office, 221 South Fourth st. One stack, 35 x 7½, built in 1835,

and rebuilt in 1864 and 1881; closed top; cold blast; product, car-wheel pig iron, made from magnetic and hematite ores, mined from $\frac{1}{2}$ mile to 8 miles from the furnace, with a mixture of Spanish ore. Annual capacity, 3,000 net tons. Brand, "Wyebrooke." Wm. M. Potts, Manager. Selling agents, L. & R. Wister & Co., 230 South Fourth st., Philadelphia.

Jefferson Furnace, J. M. & H. Y. Kaufman, Auburn, Schuylkill county. Furnace at Jefferson Station. One iron stack, 33 x 8, first put in blast May 20, 1880; cold blast; ores, hematites, from Berks and Lehigh counties; specialty, pig iron for car-wheels and heavy rolls; weekly capacity, 50 net tons. Old Jefferson Furnace, which was built in 1864 at Auburn, about half a mile from the site of the new furnace, was abandoned in 1879.

Joanna Furnace, L. Heber Smith, Joanna Furnace, Berks county. One stack, 30 x 8, built in 1792 by Potts & Rutter, and rebuilt in 1847; cold blast; water and steam power; open top; ores, local magnetic and hematite; specialty, car-wheel pig iron; annual capacity, 1,200 net tons. Brand, "Joanna."

Logan Furnace, Valentines & Co., Bellefonte, Centre county. One stack, 32 x 8, built in 1806, and rebuilt 3 miles from original site in 1843; open top; cold blast; water-power; ore, strictly neutral brown hematite; specialty, car-wheel pig iron; annual capacity, 4,000 net tons. *See Rolling Mills. See Bloomaries.*

Maiden Creek Furnace, Jacob K. Spang, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold and warm blast; water and steam power; open top; annual capacity, 1,600 net tons.

Mont Alto Furnace, Mont Alto Iron Company, Mont Alto, Franklin county. One stack, 45 x 9 $\frac{1}{2}$, built in 1807-8, and height increased in 1881; cold and warm blast; closed top; ore, exclusively neutral brown hematite, from the furnace property, which consists of 20,000 acres of land; the pig iron is used for car-wheels, chilled rolls, and blooms; annual capacity, 10,000 net tons. Brand, "Mont Alto." E. P. Dwight, President, 407 Library st., Philadelphia; George B. Wiestling, Superintendent, Mont Alto. General office at the works. All sales made by the Superintendent. *See Bloomaries.*

Mount Etna Furnace, Samuel Isett, Yellow Springs, Blair county. One stack, 31 x 8, built in 1808, and rebuilt in 1850; open top; cold blast; ore, local brown hematite; pig iron made into blooms for boiler plate and steel. Not in blast since 1877, the abandonment of the Pennsylvania Canal having deprived the works for the present of means of transportation. *See Bloomaries.*

Mount Hope Furnace, A. Bates Grubb, Mount Hope, Lancaster county. One stack, 46 x 9, built in 1784, and remodeled in 1876; closed top; warm blast; Cornwall ore; specialty, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Mount Hope."

Oley Furnace, Clymer Iron Company, Temple, Berks county. Furnace in Oley township. One stack, 30 x 8, built in 1772; open top; cold

blast; steam and water power; ores, $\frac{2}{3}$ hematite and $\frac{1}{3}$ primitive; specialty, No. 1 dead gray iron; annual capacity, 2,000 net tons. George E. Clymer, President; H. Schneider, Treasurer; A. B. Sweitzer, Manager. *See Schuylkill Valley Furnaces.*

Pine Grove Furnace, South Mountain Mining and Iron Company, Pine Grove Furnace, Cumberland county. One stack, 45 x 9 $\frac{1}{2}$, built in 1770; remodeled in 1877; hot blast; bell-and-hopper top; ore, hematite, procured on the furnace property, which comprises 27,000 acres of land. Pig iron is used for blooms; annual capacity, 5,000 net tons. J. C. Fuller, President; W. H. Woodward, Treasurer; Daniel King, Superintendent; H. A. Keefer, Assistant Superintendent. *See Bloomeries.*

Rebecca Furnace, Mrs. Elizabeth S. Lytle, Martinsburg, Blair county. One stack, 30 x 8 $\frac{1}{2}$, built in 1817 by Dr. Peter Shoenberger, and rebuilt in 1839; ore, native brown hematite; warm and cold blast; product, car-wheel pig iron; annual capacity, 2,000 net tons. Formerly operated by Dr. S. M. Royer.

Sarah Ann Smith Furnace, Jacob Smith, Bower's Station, Berks county. One stack, 30 x 10 $\frac{1}{2}$, built in 1883-4, but not yet blown in; hot blast; open top; ore, local hematite; weekly capacity, 100 net tons.

Springfield Furnace, John Royer, Williamsburg, Blair county. One stack, 31 x 8 $\frac{1}{2}$, built in 1814, and blown in in 1815; open top; warm blast; water-power; ore, brown hematite, mined near the furnace; specialty, engine-cylinder iron; annual capacity, 2,000 net tons. This furnace has stopped only for repairs since it was first blown in. O. J. McAllister, Manager. *See Bloomeries.*

Windsor Furnace, Daniel B. Fisher, Leesport, Berks county. One stack, 28 x 9, built about 1830; cold blast; open top; water and steam power; ores, mainly native hematite, with some New Jersey magnetic; annual capacity, 2,000 net tons. Blown in September 13, 1877, after a long rest.

Number of charcoal furnaces in Pennsylvania: 32 stacks.

GAS.

Alpha Furnace, Schuylkill Iron Company, Norristown, Montgomery county. One stack, 45 x 13, built in 1881 to smelt iron ore with gas fuel.

Total number of furnaces in Pennsylvania: 270 completed stacks, and 4 stacks building.

PROJECTED.

Fairmount Coal and Iron Company, Fairmount City, Clarion county. One stack contemplated. B. K. Jamison, President, Third and Chestnut sts., Philadelphia.

MARYLAND.

ANTHRACITE.

Ashland Iron Company, Ashland, Baltimore county. Three stacks: No. 1, 32 x 12, built in 1844; No. 2, 32 x 12, built in 1844; No. 3, 53 x 15,

built in 1870, and blown in in 1871; closed tops; Nos. 1 and 2 are blown by steam and water power, No. 3 by steam; fuel, anthracite coal and coke; ores, limonite and carbonate, from Baltimore, Carroll, and Prince George's counties, Md., and York county, Pa.; specialty, foundry pig iron; total annual capacity, 25,000 net tons. Brand, "Ashland." George Small, President and selling agent, Baltimore; Walter S. Franklin, Secretary and Manager, Ashland; T. C. Blair, Assistant Manager.

Catoctin Anthracite Furnace, J. B. Kunkel, Catoctin Furnaces, Frederick county. One stack, 50 x 11½, built in 1873-4; bell-and-hopper top; fuel, anthracite and coke; annual capacity, 6,000 net tons. *See Charcoal Furnaces.*

Cedar Point Anthracite Furnace, Baltimore Iron Company, Baltimore. One stack, 44 x 12, built in 1873; closed top; Brooke hot-blast stove; fuel, anthracite and coke; ores, Baltimore county, Spanish, and Irish; product, foundry, forge, and Bessemer pig iron; annual capacity, 6,000 net tons. *See Charcoal Furnaces for names of officers.*

Number of anthracite furnaces in Maryland: 5 stacks.

BITUMINOUS COAL OR COKE.

Antietam Furnace, P. A. Ahl & Brother, Sharpsburgh, Washington county. One stack, 50 x 11, built in 1845; closed top; water-power; fuel, coke; ore, brown hematite, from the vicinity of Harper's Ferry; product, principally No. 2 and No. 3 mill pig iron. Brand, "Antietam." Theodore Hoover, foreman. This is the third stack built on this site; the first one was built about 1775. Main office, Newville, Cumberland county, Pa.

Number of raw coal or coke furnaces in Maryland: 1 stack.

CHARCOAL.

Catoctin Charcoal Furnaces, J. B. Kunkel, Catoctin Furnaces, Frederick county. Two stacks, 32 x 8½ and 32 x 9, built in 1775 and 1856; open tops; warm and cold blast; steam and water power; ore, local hematite; total annual capacity, 5,000 net tons. The pig iron made here is strong, chills well, and has much affinity for other irons. William P. Kunkel, Manager. Selling agents, E. L. Harper & Co., Cincinnati, Ohio. *See Anthracite Furnaces.*

Cedar Point Charcoal Furnace, Baltimore Iron Company, Baltimore, Baltimore county. One stack, 40 x 9½, built in 1843; hot blast; closed top; ore, exclusively from Baltimore county, most of it being a carbonate; charcoal made in retorts; product, car-wheel and malleable pig iron; annual capacity, 4,500 net tons. Horace L. Brooke, President and Treasurer; G. W. P. Coates, Secretary. *See Anthracite Furnaces.*

Chesapeake Furnace, D. M. Reese & Sons, Locust Point, Baltimore. Works at Canton, Baltimore. One stack, 32 x 8½, built in 1846, and remodeled in 1882; warm blast; ores, white and brown carbonates, mined near the city of Baltimore; specialty, car-wheel and malleable

pig iron; total annual capacity, 4,000 net tons. Brand, "Chesapeake." W. E. McAbel, Manager. One stack, 32 x 8, built in 1853, dismantled in 1883. Selling agents, R. C. Hoffman & Co., 23 South Frederick st., Baltimore. *See Laurel Furnace.*

Green Spring Furnace, J. B. Haines & Co., Green Spring Furnace, Washington county. One stack, 35 x 8½, built in 1848; rebuilt in 1865; warm blast; water-power; open top; ore, red hematite, mined one mile from furnace, yielding 55 per cent.; specialty, gray pig iron; annual capacity, 1,200 net tons. Works for sale. They are located within one mile of the Chesapeake and Ohio Canal and three miles from the Baltimore and Ohio Railroad.

Harford Furnace, Harford Furnace P. O., Harford county. One stack, 28 x 6½, built in 1828; hot blast; steam and water power. Owned by Henry W. Archer, James Farnandis, and Dr. E. Hall Richardson. Has been idle for about six years. For sale; address Edwin H. Webster, Belair, Md.

Laurel Furnace, D. M. Reese & Sons, Locust Point, Baltimore. One stack, 52 x 9, built in 1856, rebuilt in 1873, and remodeled in 1882; bell-and-hopper top; warm blast; brown and white carbonate ore obtained between Baltimore and Washington, yielding 35 per cent.; product, pig iron for car-wheels, steel, and malleable purposes, known as "Laurel wheel iron," and noted for its high chilling properties; annual capacity, 5,600 net tons. The original Laurel Furnace was built in 1846; the South Baltimore Anthracite Furnace was added in 1856; both were afterwards burned, and the South Baltimore Furnace only was rebuilt, and called Laurel. D. M. Reese, Superintendent. Selling agents, R. C. Hoffman & Co., 23 South Frederick st., Baltimore. *See Chesapeake Furnace.*

Locust Grove Furnace, Furstenburg & Adler, Rossville, Baltimore county. One stack, 30 x 7½, built in 1849; hot blast; open top; ore mined at the furnace; product, car-wheel and malleable pig iron; annual capacity, 2,600 net tons. Brand, "Locust Grove."

Maryland Furnaces, H. W. Ellicott & Son, Baltimore. Two stacks, each 50 x 9, built in 1853 and 1870, and rebuilt in 1872 and 1873; closed tops; hot blast; argillaceous ore, mined near Baltimore; specialty, car-wheel and malleable pig iron; total annual capacity, 12,000 net tons. Brand, "Maryland."

Muirkirk Furnace, Charles E. Coffin, Muirkirk, Prince George's county. One stack, 29 x 8½, built in 1847; open top; Raymond & Campbell hot oven; oak and pine charcoal; ores mined in the neighborhood, roasted and crushed before using; pig iron used for car-wheels, guns, flange iron, shot, and shell; annual capacity, 4,200 net tons. Average tensile strength of six specimens of No. 4 pig, 41,329 lbs.; of No. 4½, one specimen, 50,320 lbs., and one, 52,160 lbs. Brand, "Muirkirk." Selling agents, Robinson & Orr, Pittsburgh; and Wm. E. Coffin & Co., Boston.

Principio Furnace, George P. Whitaker Company, Principio, Cecil coun-

ty. One stack, 35 x 9, built in 1723, and rebuilt in 1836; warm blast; water-power; ores, equal proportions of Baltimore hone and Iron Hill (Delaware) magnetic, brought from mines belonging to same owner in Baltimore county, Maryland, and Newcastle county, Delaware; specialty, car-wheel pig iron. Brand, "Principio." *See Bloomaries.*

Stickney Iron Company, 11 South Gay st., Baltimore. Two stacks: Furnace A, 50 x 9½, built in 1854; rebuilt in 1871; hot blast; closed top; Baltimore ore exclusively used. Brand, "Stickney Iron Co." Furnace B, 48 x 11, completed and put in blast May 15, 1882; hot blast; bell-and-hopper top; ores, a mixture of Baltimore and foreign. The pig iron produced at both furnaces is specially adapted to malleable castings and car-wheels; annual capacity of A, 5,000 net tons, B, 10,000 net tons. Geo. H. Stickney, President; Wm. Harvey, Secretary; Reed, Stickney & Co., agents.

Number of charcoal furnaces in Maryland: 14 stacks. Total number of furnaces in Maryland: 20 stacks.

VIRGINIA.

COKE.

Buffalo Gap Furnaces, Virginia Iron and Steel Company, Buffalo Gap, Augusta county. Two stacks, 35 x 9 and 40 x 10½, built in 1869 and 1873, respectively; closed tops; two hot ovens; ores, brown hematite and fossil, mined on the property; total annual capacity, 9,000 net tons. Brand, "Buffalo Gap." H. W. Howell, President; Henry J. Rogers, Secretary and Treasurer; D. P. McCorkle, Manager.

Callie Furnace, Hileman, Waring & Co., Clifton Forge, Alleghany county. Furnace in Botetourt county. One stack, 48 x 12, built in 1873-4 for charcoal, but since enlarged and changed to coke; open top; two iron hot-blast stoves; ore, hematite, from the furnace property; product, mill pig iron. Brand, "Callie." O. Hileman, Superintendent. Selling agents, E. L. Harper & Co., Cincinnati.

Crozer Furnace, Crozer Steel and Iron Company, Upland, Delaware county, Pa. Furnace at Roanoke, Roanoke county, Va. One stack, 70 x 16, built in 1882-3, and first put in operation May 29, 1883; three Whitwell hot-blast stoves; closed top; fuel, Pocahontas (Va.) coke; ore, local hematite; annual capacity, 35,000 net tons. Brand, "Crozer." Samuel A. Crozer, President; W. H. H. Robinson, Treasurer; Francis E. Weston, Secretary; D. F. Houston, General Manager, at the furnace.

Gem Furnace, Shenandoah Iron Company, Milnes, Page county. One stack, 75 x 16, built in 1882, and first blown in February 8, 1883; three Whitwell hot-blast stoves; closed top; fuel, Connellsville coke; ore, brown hematite, mined on the furnace property; product, foundry pig iron; annual capacity, 30,000 net tons. Brand, "Gem." Wm. Milnes, Jr., President; A. Creveling, Vice-President; C. H. Price, Assistant Secretary; John Milnes, Treasurer; E. C. Crowther, Superintendent. Selling agents, Justice Cox, Jr., & Co., 220 South Fourth st., Philadelphia. *See Milnes (charcoal) Furnace. See Bloomaries.*

- Longdale Iron Company, Longdale, Alleghany county. Two stacks: one stack, (Lucy Selina,) 60 x 11, built in 1827, rebuilt in 1873, and raised to 60 feet in 1876; the other stack, 60 x 14, first put in blast in February, 1881; closed tops; steam-power; fuel, West Virginia coke; ore, brown hematite, mined near the furnace; product, principally gray forge pig iron; total annual capacity, 29,000 net tons. Brand, "Longdale." F. A. Comly, President, 407 Walnut st., Phila.; J. E. Johnson, Manager. E. L. Harper & Co., Cincinnati, sole Western sales agents.
- Low Moor Furnace, Low Moor Iron Company of Virginia, Low Moor, Alleghany county. One stack, 74 x 18, built in 1880; four Whitwell fire-brick hot-blast stoves; fuel, New River coke; ore, local brown hematite; product, foundry pig iron; annual capacity, 40,000 net tons. John Means, President; H. M. Bell, Vice-President; Jno. F. Winslow, Chairman Executive Committee; A. A. Low, Treasurer; E. A. Low, Assistant Treasurer, 31 Burling Slip, New York; H. W. Goodwin, General Manager. Western sales agent, Thomas A. Mack, Cincinnati.
- Lynchburg Furnace, Lynchburg Iron Company, 235 Dock st., Philadelphia. Furnace at Lynchburg, Campbell county. One stack, 60 x 11½, first put in blast in December, 1880; remodeled in 1882, and again in 1884; bell-and-hopper top; fuel, New River coke; ores, local brown hematite and magnetic; annual capacity, 14,000 net tons. *See Rolling Mills.*
- Powhatan Furnace, Philadelphia and Reading Coal and Iron Company, 227 South Fourth st., Philadelphia. Furnace in Henrico county, on Richmond and Alleghany Railroad, 5 miles above Richmond. One stack, 50 x 13½, built for coke in 1860, called Westham Furnace, and rebuilt for anthracite in 1872-3; open top; water-power; annual capacity, 9,000 net tons. *See Schuylkill Valley (Pa.) Furnaces. See Rolling Mills.*
- Princess Furnace, D. S. Cook, Carolina, Botetourt county. Furnace at Wilton station, on the Richmond and Alleghany Railroad. One stack, 60 x 12½, built at Ashland, Boyd county, Kentucky, and first put in operation in May, 1877; removed to Virginia in 1883-4; three Whitwell fire-brick hot-blast stoves; closed top; fuel, coke; ores, brown hematite, red shale, and manganese, mined on the furnace property; annual capacity, 10,000 net tons. Furnace to be put in operation in November, 1884. T. D. Kauffelt, Manager.
- Victoria Furnace, The Iron and Steel Works Association of Virginia Limited, Goshen Bridge, Rockbridge county. Main office, London, England. One stack, 85 x 20, built in 1882-3, and first put in blast May 1, 1883; three 60 x 25 Siemens-Cowper-Cochrane fire-brick hot-blast stoves; three Mackintosh, Hemphill & Co.'s patent cut-off blowing engines, with air cylinder, 84 in. x 48 in., and steam cylinder, 48 in. x 36 in.; closed top; fuel, New River (W. Va.) coke; ore, limonite, mined near the furnace; product, neutral foundry and forge pig iron; annual capacity, 50,000 net tons. Brand, "Victoria." George Arbuthnot, Chairman, London; A. Norris, Secretary, 41 Haymarket, London;

Wm. N. Page, General Manager, and W. O. Skelton, Assistant General Manager, at the furnace. Selling agents, E. L. Harper & Co., Cincinnati, Ohio.

Number of coke furnaces in Virginia: 12 stacks.

CHARCOAL.

Amherst Furnace, operated by the executors of the estate of S. F. Jordan, Snowden, Amherst county. One stack, 33 x 9, built in 1863; warm blast; closed top; water-power; ore, brown hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. John T. Jordan, Manager. Selling agents, R. C. Hoffman & Co., Baltimore, and E. L. Harper & Co., Cincinnati.

Barren Springs Furnace, C. B. Squier, 113 Liberty st., New York. Furnace at Reed Island, Wythe county. One stack, 35 x 8, built in 1853, and rebuilt in 1873; cold blast; annual capacity, 2,000 net tons.

Cave Hill Furnace, Robert Sayers, McTeer, Wythe county. One stack, 47 x 10, built in 1881-2; open top; cold blast; ores, red and brown hematite and magnetic, mined near the furnace; Weimer blower; product, car-wheel pig iron; daily capacity, 10 net tons. A. P. Calfee, Manager.

Cedar Run Furnace, Graham & Robinson, Graham's Forge, Wythe county. One stack, 32 x 9, built in 1832; cold blast; water-power; ore mined on the furnace property; specialty, car-wheel pig iron. Selling agents, R. C. Hoffman & Co., Baltimore. J. W. Robinson, part owner and General Manager. *See Bloomaries.*

Columbia-Liberty Iron Company, Columbia Furnace P. O., Shenandoah county. Philadelphia office, 216 South Fourth st. Two stacks in Shenandoah county: Columbia Furnace, at Columbia Furnace P. O., 32 x 10, built in 1809, and rebuilt in 1829. Liberty Furnace, at Liberty Furnace P. O., 30 x 9½, built in 1821. Cold blast; ore, local red and brown hematite; product, car-wheel pig iron; total annual capacity, 32,000 net tons. Brand, "Liberty." Samuel G. Merrick, Vice-President and Acting President, Philadelphia; Charles H. Krumbhaar, Treasurer, Philadelphia; W. D. Pollard, Secretary; Jacob Wissler, Superintendent.

Crockett & Co., Crockett Depot, Wythe county. Four stacks in Wythe county: Beverly Furnace, at Crockett Depot, 33 x 9, built in 1880. Eagle Furnace, at Crockett Depot, 34 x 9, built in 1863; rebuilt in 1881. Raven Cliff Furnace, at Crockett Depot, 29 x 9, built in 1810, and rebuilt in 1876. Speedwell Furnace, at McTeer, 32 x 9, built in 1873-4. All cold blast; total annual capacity, 7,500 net tons; water-power; open tops. J. W. Robinson, Graham's Forge, part owner and General Agent. Selling agents, R. C. Hoffman & Co., Baltimore.

Glenwood Furnace, F. T. Anderson, Glenwood, Rockbridge county. One stack, 35 x 8½, rebuilt in 1874; open top; warm blast; water-power; ores, brown hematite, specular, and magnetic, mined near the furnace; product, car-wheel pig iron; annual capacity, 2,000 net tons. F. T. Anderson, Jr., Superintendent.

Grace Furnace, Tredegar Company, Richmond. Furnace at Craig's Creek, Botetourt county. One stack, 33 x 9½, built in 1850, burned in 1864, and rebuilt in 1873; cold blast; closed top; annual capacity, 1,600 net tons. Has been out of blast since 1875. *See Rolling Mills.*

Irondale Furnace, Slaughter, Dunn & Co., Crockett Depot, Wythe county. One stack, 33 x 11, built in 1881, and blown in in March, 1882; closed top; cold blast; ore, local red and brown hematite; product, No. 2 foundry pig iron; daily capacity, 15 net tons. Brand, "The Norma Iron Co." John F. Slaughter, President; George R. Dunn, Secretary and Treasurer.

Ivanhoe Furnace, New River Mineral Company, Ivanhoe Furnace P. O., Wythe county. One stack, 42 x 12, built in 1881-2, and first put in blast in March, 1882; cold blast; bell-and-hopper top; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 8,000 net tons. Main office, 49 Cliff st., New York: Joshua Hendricks, President; Jordan L. Mott, Vice-President; J. T. Pearson, Secretary and Treasurer; W. C. Van Doren, Superintendent and Agent, at the works.

Lobdell Car-wheel Company, Wilmington, Delaware. Three stacks: Brown Hill Furnace, at Red Bluff, Wythe county, 40 x 8½, built from 1870 to 1874, and rebuilt in 1882. Walton Furnace, at Max Meadows, Wythe county, 33 x 8½, built in 1872. White Rock Furnace, in Smythe county, 5 miles from Rural Retreat Station, Wythe county, 38 x 8½, built in 1875, and blown in August 9, 1875. Closed tops; cold blast; ore, local brown hematite; total annual capacity, 8,500 net tons. George G. Lobdell, President; Wm. W. Lobdell, Secretary; P. N. Brennan, Treasurer; J. H. Wissler, Superintendent.

Locust Grove Furnace, Knauer & Morret, lessees, Douglassville, Pa. Furnace at Water Lick, Warren county, Va. One stack, 36½ x 8½, built in 1843, and abandoned some years afterwards; rebuilt in 1883; one iron-pipe hot-blast stove; closed top; ore, local hematite; product, pig iron used for the production of blooms; annual capacity, 3,500 net tons. Brand, "Locust Grove." Formerly called Elizabeth Furnace.

Milnes Furnace, Shenandoah Iron Company, Milnes, Page county. Two stacks, each 33 x 9, built in 1836 and 1857; hot blast; ore, Fox Mountain brown hematite; product, forge pig iron, all used for blooms. One of these stacks, called Catharine, built in 1836, has not been in blast for several years. The other, called Furnace No. 2, has an annual capacity of 3,000 net tons. *See Gem (coke) Furnace. See Bloomaries.*

Mine Run Furnace, Powell's Fort Mining Company, Alexandria. Furnace at Mine Run Furnace P. O., Shenandoah county. One stack, 32 x 7½, built in 1872; cold blast; open top; ore, brown hematite, mined on the property; product, gray forge and car-wheel pig iron. Brand, "Mine Run, Va." A. McLean, President; John S. Barbour, Vice-President; L. W. Reid, Secretary; W. H. Marbury, Treasurer; John C. Karsten, Superintendent, at the furnace. Selling agents, Keyser Brothers & Co., Baltimore.

Mount Vernon Furnace, Abbott Iron Company, Baltimore, Md. Furnace

- near Weyer's Cave, Rockingham county. One stack, 35 x 8½, built in 1848, and rebuilt in 1874; cold blast; steam and water power; closed top; ores, neutral hematites. Brand, "Mount Vernon." *See Rolling Mills in Maryland. See Bloomaries.*
- Pierce Furnace, Foster's Falls Iron and Manufacturing Company, Foster's Falls, Wythe county. One stack, 35 x 8, built in 1881; open top; cold blast; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Brand, "Pierce." J. W. Robinson, President and Secretary; R. C. Hoffman, Treasurer; J. J. Baker, Manager. Formerly called New River Furnace.
- Panther Gap Furnace, R. H. Bell, Agent, Staunton. Furnace near Goshen, Rockbridge county. One stack, 38 x 9, completed in December, 1874; cold blast. Has made but one blast. Owned by Echols, Bell & Catlett, of Staunton, Va., and others.
- Radford Furnace, Radford Iron Company, Radford Furnace P. O., Pulaski county. One stack, 35 x 10, built in 1868; warm blast; product, car-wheel pig iron for the Car-wheel Iron Company, Richard Wood, President, 400 Chestnut st., Philadelphia.
- Reed Island Furnace, Reed Island Iron Company, Reed Island, Wythe county. Furnace in Pulaski county. Main office, Graham's Forge. One stack, 33 x 9, first put in blast April 28, 1881; cold blast; open top; water-power; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. Owners, J. W. Robinson, D. P. Graham, J. W. McGavock, and R. C. Hoffman & Co. W. R. Tipton, Superintendent.
- Salisbury Furnace, Salisbury Iron Manufacturing Company, Salisbury Furnace, Botetourt county. New York office, 45 Exchange Place. One stack, 32 x 10, built in 1869; hot and cold blast; open top; water-power; ore, hematite, mined on the furnace property; product, car-wheel pig iron; annual capacity, 4,000 net tons. Brand, "Virginia Salisbury." Eugene Kelly, President and Treasurer; W. Plunket, Secretary; H. S. Dakin, Superintendent. Selling agents, A. Pleumer & Co., Cincinnati, Ohio.
- Sinking Creek Iron Works, J. Willcox Brown, Newport, Giles county. One stack, 35 x 9½, built in 1873; warm blast; water-power. E. P. Williams, Superintendent.
- Van Buren Furnace, Dr. Frank King, Van Buren Furnace, Shenandoah county. One stack, 37½ x 9, built in 1850; rebuilt in 1870; closed top; cold blast, but arranged for hot; ore, local hematite; product, car-wheel pig iron; annual capacity, 2,500 net tons. Brand, "King."
- Virginia Furnace, Waynesboro, Augusta county. One stack, 32 x 9, built in 1804; hot blast; ores, honey-combed and red and black hematite; product, foundry pig iron, very soft and strong. Brand, "Virginia." Formerly called Mount Torrey Furnace.
- Wythe Furnace, Crockett, Oglesby & Co., Graham's Forge. Furnace at Crockett Depot, Wythe county. One stack, 25 x 8, built in 1819, and rebuilt in 1873; open top; cold blast; ore, local red and brown hematite; product, car-wheel pig iron; annual capacity, 1,500 net tons. J.

W. Robinson, Graham's Forge, part owner and General Agent. Selling agents, R. C. Hoffman & Co., Baltimore.

Number of charcoal furnaces in Virginia: 31 stacks. Total number of furnaces in Virginia: 43 completed stacks.

PROJECTED.

Harmer, Randle & Co., Luray, Page county. One stack projected. A. C. Harmer, President; William Glading, Vice-President; O. C. Brothers, Treasurer; Arthur E. Randle, Secretary.

NORTH CAROLINA.

CHARCOAL.

American Iron and Steel Company, Lockville, Chatham county. Two stacks: Buckhorn Furnace, 54 x 10, built in 1873; Endor Furnace, 39 x 8, remodeled in 1872-3; hot blast; water-power; closed tops; total annual capacity, 7,000 net tons. George G. Lobdell, President; George G. Lobdell, Jr., Secretary; W. W. Lobdell, Treasurer; J. H. Wissler, Superintendent. These furnaces have been idle for a number of years, but they are in condition to go into blast again when railroads are built to convey ore to them.

Cranberry Furnace, Cranberry Iron and Coal Company, Cranberry, Mitchell county. Philadelphia office, 237 South Third st. One stack, 50 x 10, built in 1883-4, and first put in blast April 16, 1884; closed top; water-power; hot and cold blast; ore, magnetic, mined on the property; annual capacity, 6,000 net tons. Brand, "Cranberry." A. Pardee, Jr., President; J. S. Wise, Secretary and Treasurer; A. Nimson, Superintendent.

Madison Furnace, Jonas W. Derr, Lincolnton, Lincoln county. One stack, 32 x 6, built in 1810; cold blast; water-power. *See Bloomaries.*

Ore Hill Furnace, S. H. Wiley, Salisbury. Works at Ore Hill, Chatham county. One stack, 30 x 8, built in 1862; hot blast; daily capacity, 10 net tons. Not in blast since 1873. Since the completion recently of the Cape Fear and Yadkin Valley Railway arrangements have been made to put the furnace in blast.

Rehoboth Furnace, John Leonard & Co., Iron Station, Lincoln county. One stack, 38 x 9½, built in 1810; cold blast; water-power; annual capacity, 1,200 net tons. Selling agent, Wm. C. Benedict, at the works.

Number of furnaces in North Carolina: 6 charcoal stacks.

PROJECTED.

A furnace is projected at Asheville by Prof. W. H. A. Schrieber, of New York.

GEORGIA.

COKE.

Rising Fawn Furnace, Walker Iron and Coal Company, Rising Fawn, Dade county. One stack, 63 x 16, built in 1873-5; put in blast June

18, 1875; three Whitwell hot-blast stoves; open top; ore, fossiliferous, mined near the furnace; annual capacity, 30,000 net tons. Joseph E. Brown, President, Atlanta; Julius L. Brown, Vice-President and Secretary, Atlanta; James C. Warner, General Agent, Nashville; Louis S. Colyar, General Manager, Rising Fawn.

Number of coke furnaces in Georgia: 1 stack.

CHARCOAL.

Cherokee Iron Works, Cherokee Iron Company, Cedartown, Polk county. One stack, 60 x 12½, built in 1874-5; blown in March 22, 1877; closed top; hot blast; ore, brown hematite, mined near the works; annual capacity, 11,000 net tons. The company intends to build an additional stack. A. G. West, President and Superintendent; John H. Browning, of New York, Treasurer; J. R. Barber, Secretary. Selling agents, E. L. Harper & Co. and Rogers, Brown & Co., Cincinnati; George H. Hull & Co., Louisville; and Millard & Combs and Coleman & Brother, St. Louis.

Diamond Furnace, W. P. Ward, Cartersville, Bartow county. One stack, 33 x 8, built in 1856; closed top; warm blast; Weimer blowing engine; ore, brown hematite, mined on the property; product, car-wheel pig iron, marketed in Louisville and St. Louis; daily capacity 5½ net tons. Brand, "Diamond Iron." Ran on spiegeleisen and ferromanganese in 1875.

Etna Furnace, Etna Furnace Company, lessee, Etna, Polk county. One stack, 41 x 8, built in 1870; closed top; ore, brown hematite, mined on the property; product, strictly cold-blast car-wheel pig iron; annual capacity, 3,600 net tons. Brand, "Etna." John E. Stillwell, Agent.

Hermitage Furnace, Hermitage, Floyd county. Located eight miles north of Rome, on Selma Division of East Tennessee, Virginia, and Georgia Railroad. One stack, 60 x 10, built in 1874; product, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Hermitage." Edward Nichols, President and General Manager.

Thomas & Brown, Stamp Creek, Bartow county. Two stacks: Oak Grove Furnace, 30 x 7, built in 1842; and "The New Stack," 30 x 7, built in 1863; cold blast; water-power; open tops; daily capacity, 10 net tons.

Number of charcoal furnaces in Georgia: 6 stacks. Total number of furnaces in Georgia: 7 stacks.

ALABAMA.

COKE.

Alice Furnaces, Alice Furnace Company, Birmingham, Jefferson county. Two stacks: No. 1, 63 x 15, built in 1879-80, and put in blast November 23, 1880; closed top; three 48-pipe iron hot-blast stoves. No. 2, 75 x 18, built in 1883, and put in blast July 24, 1883; closed top; three Whitwell fire-brick hot-blast stoves. Ores, brown and red hematite and limonite, from the company's mines; specialties, best grade of coke foundry and mill pig iron; total annual capacity, 60,000 net tons.

Brand, "Alice." T. T. Hillman, President and General Manager; F. H. Armstrong, Secretary; J. J. Gray, Special Agent, Room 13, Johnston Building, Cincinnati, Ohio. Selling agents, Coleman & Brother, St. Louis, and Minnigerode & Co., New Orleans.

Bibb Furnace, Brierfield Iron and Coal Company, Brierfield. Furnace at Bibb Furnace, Bibb county. One stack, 50 x 10½, built in 1864 to use charcoal, and rebuilt in 1881; closed top; cold blast; ore, brown hematite, mined in the immediate vicinity; annual capacity, 4,500 net tons. The furnace is at present being remodeled to use coke. *See Rolling Mills.*

Edwards Iron Company, Woodstock, Bibb county. One stack, 55 x 12, blown in June 10, 1880. The furnace was begun by Giles Edwards in 1873, and intended to be a charcoal furnace, but work was discontinued until 1879, when the present company was organized to complete the furnace, and at the same time to enlarge it to use coke. Ore, local brown hematite; product, foundry and mill pig iron; annual capacity, 11,000 net tons. At present out of blast. The company contemplates making extensive improvements before going into blast again. Giles Edwards, President; F. H. Armstrong, Secretary and Treasurer; T. J. Edwards, Superintendent. Selling agents, Rogers, Brown & Co., Cincinnati, and Millard & Combs, St. Louis.

Eureka Company, Oxmoor, Jefferson county. Two stacks: No. 1, 60 x 16, completed in July, 1877; No. 2, 60 x 14, completed in March, 1876; closed tops; total annual capacity, 30,000 net tons. Officers at Cincinnati, Ohio: D. J. Fallis, President; J. H. Rogers, Treasurer; T. A. Mack, General Sales Agent; and J. T. Fallis, Secretary and Acting Treasurer. Robert Stephens, Superintendent, Oxmoor.

Mary Pratt Furnace, Mary Pratt Furnace Company, Birmingham, Jefferson county. One stack, 55 x 11, built in 1883, and first put in blast in April, 1883; two Whitwell hot-blast stoves; hot or cold blast; fuel, sometimes coke and sometimes charcoal; ore, brown and red fossiliferous, mined within 25 miles of the furnace; annual capacity, 15,000 net tons. Brand, "Mary Pratt." H. F. De Bardeleben, President; W. T. Underwood, Secretary, Treasurer, and General Manager; J. H. Edwards, Superintendent.

Sloss Furnaces, Sloss Furnace Company, Birmingham, Jefferson county. Two stacks: No. 1, 65 x 16½, built in 1881-2, and put in blast April 12, 1882; No. 2, 75 x 16½, built in 1882; closed tops; six Whitwell hot-blast stoves; ores mined on the company's property in Central Alabama; product, foundry and mill pig iron; annual capacity, 60,000 net tons. Officers at the works: J. W. Sloss, President; Fred. Sloss, Secretary and Treasurer; Mac. Sloss, Superintendent. B. F. Gunthrie, Louisville, Ky., Vice-President and General Sales Agent.

Woodward Iron Company, Wheeling, Jefferson county. One stack, 75 x 17, built in 1882-3, and put in blast in August, 1883; closed top; three Whitwell hot-blast stoves, each 70 x 18; fuel, coke, made from the company's coal; ores, brown hematite, red fossil, and blackband,

mined within three miles of the furnace; specialty, foundry pig iron; annual capacity, 30,000 net tons. Brand, "Woodward." W. H. Woodward, President; J. H. Woodward, Secretary and Treasurer.
Number of coke furnaces in Alabama: 10 stacks.

CHARCOAL.

Clifton Furnace, Clifton Iron Company, Jenifer, Talladega county. One stack, 55 x 10, built in 1873; closed top; hot blast; ore, brown hematite; product, strictly neutral car-wheel pig iron; annual capacity, 7,500 net tons. Brand, "Clifton." Building a second stack at Irona, nine miles southwest of Jenifer, to be 55 x 12, and have a daily capacity of 40 net tons. It will be put in blast in October, 1884. Samuel Noble, President; John E. Ware, Secretary and Treasurer; Stephen N. Noble, Superintendent. Selling agents, Matthew Addy & Co., Cincinnati.

Coosa Furnace, Coosa Furnace Company, Gadsden, Etowah county. One stack, 62 x 11, built in 1882 with material formerly composing the Vigo Iron Company's No. 1 furnace at Terre Haute, Ind.; blown in May 30, 1883; partly destroyed by fire in 1883, and rebuilt in 1884; hot blast; closed top; ore, local hard and soft red hematite; product, foundry and mill pig iron; annual capacity, 7,200 net tons. Brand, "Coosa." A. J. Crawford, President, Terre Haute, Ind.; E. G. Eaton, Secretary; R. P. Gobin, Treasurer and Superintendent. Selling agents, George H. Hull & Co., Louisville, Ky.

Cornwall Iron Works, Hugh McCulloch, Cedar Bluff, Cherokee county. One stack, 44 x 9, built in 1862; cold blast; water-power. Agent, Thomas McCulloch, Rome, Georgia. Idle for several years.

Rock Run Furnace, Bass Furnace Company, Rock Run, Cherokee county. One stack, 47 x 9, built in 1873-4, and enlarged in 1881; hot blast; bell-and-hopper top; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 7,000 net tons. Brand, "Rock Run." J. H. Bass, President, Fort Wayne, Indiana; A. D. Guild, Secretary, Fort Wayne; J. I. White, Treasurer, Fort Wayne; Frank Fitch, Manager.

Round Mountain Iron Works, W. C. Sibley, Secretary for the owners, Augusta, Georgia. Furnace at Round Mountain, Cherokee county, Ala. One stack, 45 x 8½, built in 1853; rebuilt and put in blast in June, 1874, after a long rest; cold blast; closed top; ore, red fossiliferous, yielding 58 per cent.; specialty, car-wheel pig iron; annual capacity, 2,500 net tons. Brand, "Round Mountain."

Shelby Furnaces, Shelby Iron Company, Shelby Iron Works, Shelby county. Two stacks, 56 x 12 and 60 x 14, built in 1863 and 1873, respectively; warm blast; closed tops; ore, brown hematite, obtained on the furnace property; product, car-wheel pig iron; total annual capacity, 20,000 net tons. Brand, "Shelby." Newton Case, President and Treasurer, Hartford, Conn.; Robert E. Day, Vice-President; Charles J. Hazard, Secretary; E. T. Witherby, Assistant Secretary; J. A. McArthur, General Manager. Selling agent, W. H. Hoffman, 13 Johnston Building, Cincinnati, Ohio.

Stonewall Iron Works, Rock Run, Cherokee county. One stack, 40 x 10½, built in 1873; hot blast; closed top; ore, brown hematite; specialty, foundry pig iron; annual capacity, 6,000 net tons. Out of blast.

Tecumseh Furnace, Tecumseh Iron Company, Tecumseh, Cherokee county. One stack, 60 x 12, built in 1873, and put in blast February 19, 1874; hot blast; closed top; ore, local brown hematite; product, foundry, mill, and chilling irons; annual capacity, 14,000 net tons. Furnace ran 7 years, 1 month, and 18 days on one hearth without blowing out. Brand, "Tecumseh." Willard Warner, President and Manager; A. E. Buck, Secretary and Treasurer; Willard Warner, Jr., Assistant Manager. Selling agents, Rogers, Brown & Co., Cincinnati.

Woodstock Furnaces, Woodstock Iron Company, Anniston, Calhoun county. Two stacks: No. 1, 43 x 12, first blown in April 13, 1873; rebuilt to 50 x 12, and blown in February 12, 1880; No. 2, 50 x 12, first blown in August 27, 1879; hot and cold blast; closed tops; product, car-wheel pig iron and spiegeleisen; total annual capacity, 20,000 net tons. Brand, "Woodstock." Alfred L. Tyler, President; Samuel Noble, Secretary and Treasurer; C. M. Noble, Manager. Selling agents, Matthew Addy & Co., Cincinnati; Geo. H. Hull & Co., Louisville; Hoffer & Co., St. Louis; and Stevenson, Peirson & Co., Boston.

Number of charcoal furnaces in Alabama: 11 completed stacks, and 1 stack building. Total number of furnaces in Alabama: 21 completed stacks, and 1 stack building.

PROJECTED.

Alpine Iron and Manufacturing Company, Alpine, Talladega county. Contemplates building a hot-blast charcoal furnace near Alpine.

Lady Ensley Mining and Manufacturing Company. Contemplates building two large furnaces near Russellville, Franklin county.

Phillips-Buttorff Manufacturing Company, Nashville, Tenn. Contemplates building a furnace near Birmingham, Ala.

Sheffield Land, Iron, and Coal Company, whose office is at Tuscumbia, contemplates erecting a blast furnace at Sheffield.

TEXAS.

CHARCOAL.

Alcalde Furnace, Comer & Fairris, lessees, Rusk, Cherokee county. One stack, 55 x 9½, built in 1883, and put in blast February 27, 1884. Closed top; warm blast; ore, brown hematite, mined near the furnace; product, foundry pig iron; annual capacity, 4,000 net tons. John T. Veitch, Superintendent. The furnace is owned by the State of Texas.

Lou-Ellen Furnace, Marshall Car and Foundry Company, Marshall, Marion county. Furnace at Kellyville, Marion county. One stack, 55 x 8½, built in 1869; rebuilt in 1873-4 and 1882; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 3,000 net tons. Brand, "Lou-Ellen." Formerly called Kelly Furnace. Building another stack. Charles Cobb, President, 145 Broadway, New

York; John F. Dickson, Vice-President and General Manager, Marshall; George Anderson, Secretary and Treasurer, Marshall; George W. Brown, Furnace Superintendent.

Number of furnaces in Texas: 2 completed charcoal stacks, and 1 stack building.

WEST VIRGINIA.

COKE.

Belmont Furnace, Belmont Nail Company, Wheeling, Ohio county. One stack, 60 x 16, first blown in September 4, 1875; closed top; two iron-pipe hot-blast stoves; fuel, Connellsville coke; ores, Lake Superior; specialty, No. 1 mill pig iron, strictly red-short; annual capacity, 18,000 net tons. Brand, "Belmont." *See Rolling Mills.*

Bettie Furnace, Black Band Iron and Coal Company, Charleston, Kanawha county. Furnace located at the mouth of Davis creek, on the Great Kanawha river, 4 miles below Charleston. One stack, 50 x 10½, commenced in 1882, and completed and put in blast in 1883; fuel, coke; ores, local blackband, block, and limonite; daily capacity, 30 net tons. John Wooldedge, President; F. A. Dearborn, Secretary; Wm. S. Denny, Treasurer; C. K. McDermott, Manager; J. H. Huling, Superintendent.

Irondale Furnace, F. Nemegyei, Raccoon, Preston county. New York office, 99 Water st. One stack, 62 x 13, built in 1861, and rebuilt in 1878-9; fuel, coke, manufactured from coal mined on the property; ores, a mixture of half and half limonite and hematite, also obtained on the property; product, slightly cold-short pig iron; annual capacity, 10,000 net tons. Brand, "F. N." Alex. Strausz, General Manager.

Quinnimont Furnace, Quinnimont Coal and Iron Company, Quinnimont, Fayette county. Office, 407 Walnut st., Philadelphia. One stack, 60 x 16, built in 1874; closed top; fuel, coke; ore, Virginia brown hematite; product, principally foundry pig iron; annual capacity, 12,000 net tons. F. A. Comly, President, and C. Gilpin, Jr., Secretary and Treasurer, Philadelphia; S. B. Patterson, Manager, at the furnace.

Riverside Furnace, Riverside Iron Works, Wheeling. Furnace at Benwood, Marshall county. One stack, 75 x 17, built in 1872, and remodeled in 1876; closed top; fuel, Connellsville coke; ores, best grades of Lake Superior and Missouri; product, Bessemer pig iron; annual capacity, 40,000 net tons. Brand, "Riverside." *See Rolling Mills.*

Top Mill Furnace, Wheeling Iron and Nail Company, Wheeling. One stack, 65 x 17, built in 1873-4; first blown in October 3, 1878; at present lined to 16½ feet across bosh; closed top; four iron hot-blast stoves; fuel, Connellsville coke; ores, Lake Superior; product, gray forge pig iron; annual capacity, 30,000 net tons. *See Rolling Mills.*

Waldorf Furnace, Keyser Brothers & Co., Baltimore. Furnace at Iron-town, Taylor county. One stack, 50 x 12, built in 1873; fuel, coke; ore, local limestone; closed top; annual capacity, 6,000 net tons.

Number of coke furnaces in West Virginia: 7 stacks.

CHARCOAL.

Bloomery Furnace, Bloomery Furnace Company, Bloomery P. O., Hampshire county. One stack, 40 x 9, built in 1844; rebuilt in 1880; closed top; cold blast; product, car-wheel and mill pig iron; weekly capacity, 60 net tons. Property for sale. John Birkinbine, 144 South Fourth st., Philadelphia.

Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county. One stack, 32 x 8, built in 1822 by James Sterrett, and run by him for some time, then sold to Geo. F. Hupp, and in 1856 bought by J. J. Keller, who has since run the works; open top; cold blast; ore, local hematite; product, car-wheel iron; annual capacity, 1,500 net tons.

Elk River Furnace, Elk River Iron Company, Strange Creek, Braxton county. One stack, 42 x 11½, built in 1874-6; cold blast; ores, mixture of limestone, spathic, and hematite, all mined on the property; product, car-wheel pig iron; annual capacity, 5,000 net tons. B. J. Jordan, President; A. R. Lake, Treasurer; M. T. Frame, Secretary.

Gladeville Furnace, Eugene List, Wheeling. Furnace at Gladeville, Preston county. One stack, 36 x 7½, built in 1872; warm blast; ore mined on the property; daily capacity, 9 net tons.

Kanawha Iron Company, Coal Valley, Fayette county. One stack, 48 x 13, begun in 1875, but not yet completed; closed top; Whitwell hot-blast; daily capacity to be 40 net tons. N. I. Bigley, President; G. L. Drouillard, Secretary.

Virginia Furnace, "Falls of Muddy Creek," Preston county. One stack, 30 x 6, built in 1855, and first blown in in 1856; water-power; cold blast; brown hematite ore; product, foundry and forge pig iron; daily capacity, 6 net tons.

Number of charcoal furnaces in West Virginia: 5 completed stacks, and 1 unfinished stack. Total number of furnaces in West Virginia: 12 completed stacks, and 1 unfinished stack.

KENTUCKY.

BITUMINOUS COAL OR COKE.

Ashland Furnace, Ashland Coal and Iron Railway Company, Douglas Putnam, Jr., General Superintendent, Ashland, Boyd county. One stack, 62 x 15½, built in 1869; four Whitwell hot-blast stoves, each 52 x 16, added in 1877; closed top; fuel, raw coal; ores, Missouri and native; annual capacity, 20,000 net tons. Brand, "Ashland." John Means, President; John G. Peebles, Vice-President; Robert Peebles, Secretary and Treasurer.

Licking Furnace, Swift's Iron and Steel Works, 26 West Third st., Cincinnati. Works at Newport, Campbell county, Ky. One stack, 65 x 16, built in 1859; enlarged in 1869; four Player iron hot-blast stoves; closed top; fuel, Connellsville coke; annual capacity, 17,000 net tons. Sales agents, E. L. Harper & Co., Cincinnati. *See Rolling Mills.*

Norton Iron Works, Ashland, Boyd county. One stack, 68 x 16, built in 1873; blown in February 16, 1874; remodeled and improved in 1877;

four Whitwell hot-blast stoves, each 50 x 16; closed top; ores, Iron Mountain, (Missouri,) Lake Superior, and native; fuel, bituminous coal and coke; product, forge pig iron; annual capacity, 20,000 net tons. *See Rolling Mills.*

Number of bituminous furnaces in Kentucky: 3 stacks.

HANGING ROCK DISTRICT—CHARCOAL.

Bellefonte Furnace, Means, Russell & Means, Ashland, Boyd county. Furnace in Greenup county. One stack, 33 x 10½, built in 1826; hot blast; open top; annual capacity, 3,000 net tons. John Russell, Manager.

Charlotte Furnace, Grayson, Carter county. One stack, 50 x 11, built in 1873; iron shell; warm blast; closed top; native ores; annual capacity, 4,000 net tons. Formerly called Iron Hills Furnace. Not in blast. For sale. Owners, Edward Avery, of Boston, and H. W. Brum, of New York.

Hunnewell Furnace, Eastern Kentucky Railway Company, Hunnewell, Greenup county. One stack, 48½ x 10, built in 1852, and rebuilt in 1870; hot blast; open top; limestone, kidney, and block ores; specialty, foundry pig iron; annual capacity, 6,000 net tons. Brand, "Hunnewell." Main office, Riverton. E. V. R. Thayer, President; H. W. Bates, Vice-President; R. Sullivan, Secretary and Treasurer; C. Whittington, Superintendent. Agency, 10 West Third st., Cincinnati.

Mount Savage Furnace, Joseph S. Woolfolk, lessee, Mount Savage, Carter county. One stack, 40 x 11, built in 1848; hot blast; open top; limestone, kidney, block, and slate ores; specialty, No. 1 foundry pig iron; annual capacity, 4,000 net tons. Brand, "Mount Savage XXX." Selling agents, Jacob Traber & Co., Cincinnati.

Pine Grove Furnace, Spriggs & Sanders, Quincy, Lewis county. Furnace in Greenup county. One stack, 17 x 6, built in 1881, and blown in October 15, 1881; cold blast; open top; ore, local red limestone; product, car-wheel pig iron; annual capacity, 700 net tons. Brand, "Hanging Rock." Joseph Spriggs, Manager.

Raccoon Furnace, Raccoon Mining and Manufacturing Company, Greenup, Greenup county. One stack, 35 x 10½, built in 1831; open top; ores, limestone, kidney, and block, mixed in equal quantities; cold and hot blast; annual capacity, 4,000 net tons. There are 10,000 acres of land in connection with this furnace, comprising fine timber land, an abundance of ore, and three veins of workable coal. Not in blast. Property for sale. E. F. Dulin, President; W. J. Worthington, Secretary.

Number of charcoal furnaces in Hanging Rock region of Kentucky: 6 stacks.

MISCELLANEOUS—CHARCOAL.

Bath Furnace, Olympian Springs, Bath county. One stack, 40 x 10½, built in 1839; rebuilt in 1872-3; cold blast; product, car-wheel pig iron.

Central Kentucky Land, Mining, Manufacturing, and Transportation Company, Clay City, Estill county. Three stacks: Estill Furnace, at Furnace P. O., Estill county, one stack, 32 x 10, built in 1830; cold blast; open top; ore, native red hematite; specialty, "Red River Car-wheel" pig iron; annual capacity, 3,000 net tons. Fitchburg Furnaces, at Furnace P. O., Estill county, two stacks, each 50 x 14, built in 1869; have not been in blast since 1874. A. G. P. Dodge, President; Benjamin Strong, Secretary; Benjamin Crawford, Treasurer; A. E. Voorhees, Manager.

Cottage Furnace, Joel McKinney, Union Hall, Estill county. One stack, 38 x 10½, built in 1855; cold blast; open top; ore, local red hematite; product, car-wheel pig iron; annual capacity, 3,000 net tons. Brand, "Cottage."

Hematite Furnace, J. H. Hillman, Hematite P. O., Trigg county. Formerly called Centre Furnace. One stack, 36 x 11, built in 1852, and remodeled in 1880; cold blast; product, car-wheel pig iron; daily capacity, 16 net tons.

Laura Furnace, C. Beringer, 106 Fourth avenue, Pittsburgh, Pa. Works at Laura Furnace P. O., Trigg county. One stack, 36 x 9, built in 1851; cold blast; product, pig iron suited for boiler plate and car-wheels. This furnace has not been in blast since 1874. The property comprises 8,500 acres; offered for sale.

Trigg Furnace, Trigg Furnace P. O., Trigg county. One stack, 48 x 12, built in 1871; hot and cold blast; daily capacity, 18 net tons. Has not been in blast since 1876. Thomas H. Grinter, Commissioner, Cadiz, Ky. For sale to close partnership of D. Hillman & Sons.

Number of charcoal furnaces in Kentucky outside of Hanging Rock region: 8 stacks. Total number of furnaces in Kentucky: 17 stacks.

TENNESSEE.

BITUMINOUS COAL OR COKE.

Chattanooga Iron Company, Chattanooga, Hamilton county. One stack, 61 x 13½, completed in 1874, and blown in in September, 1874; rebuilt in 1882; closed top; two iron hot-blast stoves; fuel, Dade county (Ga.) coke; ores, native fossiliferous and hematite; annual capacity, 16,500 net tons. Specialty, neutral gray forge pig iron. J. Lane, President; L. S. Colyar, Vice-President and General Manager; T. P. Wells, Secretary and Treasurer.

Citico Furnace, Citico Furnace Company, Chattanooga, Hamilton county. One stack, 69 x 16, built in 1883, and first put in blast in April, 1884; three Whitwell fire-brick hot-blast stoves; fuel, coke, made from coal obtained near the furnace; ores, Tennessee and Georgia red and brown hematite; product, forge and foundry pig iron; annual capacity, 30,000 net tons. Brand, "Citico." H. S. Chamberlain, President; D. P. Montague, Secretary; Edward Doud, Treasurer and General Manager.

Dayton Coal and Iron Company Limited, Dayton, Rhea county. Has commenced the erection of two coke furnaces, 75 x 20, to have six

Whitwell hot-blast stoves and a total annual capacity of 100,000 net tons. The company is composed of English and Scotch capitalists. Main office, Saltaire, England. Sir Titus Salt is a leading member of the company. John H. Ferguson, Manager.

Oakdale Furnace, Jenks, Roane county. One stack, 64 x 16, first put in blast November 11, 1873; situated on the line of the Walden's Ridge Railroad; closed top; iron-pipe hot-blast; ores, fossil and red and brown hematite; annual capacity, 21,000 net tons. Is at present out of blast, and must be remodeled before it can again be operated.

Rockwood Furnaces, Roane Iron Company, Rockwood, Roane county. Office at Chattanooga. Two stacks, 65 x 16 and 65 x 14, built in 1867 and 1872; fuel, raw coal and coke; closed tops; total annual capacity, 40,000 net tons. M. M. Duncan, Superintendent. *See Rolling Mills.*

Tennessee Coal, Iron, and Railroad Company, Nashville. Three stacks: Sewanee A Furnace and South Pittsburg Furnaces, No. 1 and No. 2. The Sewanee A Furnace, at Cowan, Franklin county, is 65 x 15; first put in blast in June, 1880; three Whitwell stoves. Brand, "Sewanee." The South Pittsburg Furnaces were built by the Southern States Coal, Iron, and Land Company Limited, at South Pittsburg, Marion county: No. 1, 70 x 18, first blown in May 2, 1879; No. 2, 70 x 18, completed in 1881; seven Whitwell hot-blast stoves; product, foundry pig iron. Brand, "South Pittsburg." Closed tops; fuel, coke, made in the company's ovens at Tracy City; ore, chiefly hard red fossiliferous, from the Inman mines of the company near South Pittsburg; annual capacity: Sewanee A Furnace, 30,000 net tons; South Pittsburg Furnaces, 80,000 net tons. James C. Warner, President; N. Baxter, Jr., Vice-President; James Bowron, Secretary and Treasurer; all at Nashville. A. M. Shook, General Manager, Tracy City; J. Lodge, Superintendent, South Pittsburg; A. Short, founder, Cowan. Selling agents, Rogers, Brown & Co., Cincinnati; Coleman & Bro., St. Louis; Geo. H. Hull & Co., Louisville; L. Warner, Nashville.

Number of bituminous coal or coke furnaces in Tennessee: 8 stacks, and 2 stacks building.

EASTERN OR UNAKA REGION—CHARCOAL.

Butler Furnace, R. R. Butler, Taylorsville, Johnson county. One stack, 35 x 8, built in 1881, and first blown in in October, 1881; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 2,000 net tons. George O. Butler, Superintendent.

Knoxville Car-wheel Company, Knoxville. Furnaces at Carter's Furnace P. O., Carter county. Two stacks: Carter Furnace, 32 x 8, built in 1840, and Speedwell Furnace, 41 x 9, built in 1880; cold blast; water-power; ore, local red and brown hematite; product, car-wheel pig iron; annual capacity, 6,000 net tons. Brands, "Carter" and "Speedwell." Charles H. Brown, President; J. A. Quaife, Vice-President; W. P. Washburn, Secretary and Treasurer; James Esdale, Superintendent of wheel works.

Sullivan County Furnace, Jenkins, Hodge & Co., Union Depot, Sullivan county. One stack, 35 x 8, first put in blast in 1881; cold blast; open top; water-power; ore, local brown hematite; product, hollow-ware; daily capacity, 4 net tons.

Number of charcoal furnaces in Eastern region of Tennessee: 4 stacks.

WESTERN REGION—CHARCOAL.

Bear Spring Furnace, Cumberland Iron Works Company, Nashville.

Works in Stewart county. One stack, 38 x 11½, built in 1832, abandoned in 1854, and rebuilt in 1873; open top; cold blast; ore, native brown hematite; specialty, car-wheel pig iron; annual capacity, 5,000 net tons. Brand, "Dover." Dover Furnace, 5 miles from Bear Spring Furnace, has been idle for many years. J. P. Drouillard, President; Joseph Vaulx, Vice-President; Albert W. Harris, Secretary and Treasurer.

Cumberland Furnace, Drouillard Iron Company, Nashville. Works at Cumberland Furnace, Dickson county. One stack, 35 x 10½, built in 1825; hot blast; open top; ore, local brown hematite; specialty, No. 1 foundry pig iron; annual capacity, 4,000 net tons. J. P. Drouillard, President; Edgar Jones, Secretary.

La Grange Iron Company, Stribling, Stewart county. Main office, 411 Olive st., St. Louis, Mo. One stack, 65 x 12, built in 1832, and rebuilt in 1880 and 1884; hot blast; closed top; ore, local brown hematite; specialty, foundry pig iron. Brand, "La Grange." Clark Furnace, 42 x 9½, built in 1854; abandoned in 1883. E. C. Sterling, President; H. W. Eliot, Vice-President; G. F. Baker, Secretary and Treasurer; T. C. Baker, Manager, at the works.

Napier Furnace, Napier Iron Company, Columbia, Maury county. Furnace at Chief P. O., Lawrence county. One stack, 32 x 9, built in 1860, and repaired in 1873; cold blast; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 4,000 net tons. W. C. Whitthorne, President; W. P. Ingram, Secretary and Treasurer; J. E. R. Carpenter, Superintendent and Manager.

Warner Furnace, Warner Iron Company, Nashville. Furnace at Warner, Hickman county. One stack, 55 x 11, first put in blast November 12, 1881; hot or cold blast; closed top; ore, local brown hematite; product, car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "Warner." James C. Warner, President; Leslie Warner, Secretary and Treasurer; Percy Warner, Vice-President and General Manager; L. S. Goodrich, Superintendent.

Number of charcoal furnaces in Western region of Tennessee: 5 stacks. Total number of furnaces in Tennessee: 17 stacks, and 2 stacks building.

OHIO.

HANGING ROCK—CHARCOAL.

Bloom Furnace, J. D. Clare & Co., Bloom Switch, Scioto county. One stack, 33 x 11, built in 1832, and rebuilt in 1846; hot blast; open top;

product, No. 1 foundry pig iron; annual capacity, 3,000 net tons. Brand, "Bloom." Furnace building lighted at night by natural gas from an 800-foot well. John H. Simmons, Secretary; Oliver Lyons, Manager.

Buckeye Furnace, Buckeye Furnace Company, Riverton, Jackson county. One stack, 40½ x 10, built in 1851; open top; hot blast; ore, red limestone, mined on the property; specialty, No. 1 and No. 2 foundry pig iron; annual capacity, 4,000 net tons. John D. Davis, Superintendent and Agent; T. J. Williams, Secretary and Treasurer; Lot Davies, Manager.

Buckhorn and Olive Furnaces, Campbell, McGugin & Co., Olive Furnace P. O., Lawrence county. Two stacks: Buckhorn Furnace, 38 x 10, built in 1833, and rebuilt in 1852; hot and warm blast; open top; annual capacity, 3,000 net tons. Brand, "B. H." Olive Furnace, 37 x 10½, built in 1846; hot and warm blast; open top; annual capacity, 4,000 net tons. Brand, "O." Native limestone ore is used. Superintendent, W. H. McGugin.

Centre Furnace, W. D. Kelly & Sons, Ironton, Lawrence county. One stack, 40 x 10½, built in 1837; cold and warm blast; open top; ore, native limestone; product, car-wheel and extra strong machinery iron; total annual capacity, 5,000 net tons. Grant Furnace, 43 x 11, built in 1869, has been abandoned.

Cornelia Furnace, Cornelia Furnace Company, Jackson, Jackson county. One stack, 37 x 10½, built in 1853, and first put in blast in 1854; open top; hot and cold blast; ore, principally local limestone; product, mainly No. 1 and No. 2 foundry and car-wheel pig iron; annual capacity, 4,000 net tons. Hot-blast iron brand, "Cornelia;" cold-blast, "Lincoln." First called Iron Valley Furnace and then Lincoln Furnace. J. M. McGhee, Agent. Selling agents, Matthew Addy & Co., Cincinnati.

Etna Furnace, Etna Iron Works, Ironton, Lawrence county. One stack, 32 x 10, built in 1832; open top; cold blast; ore, native limestone; specialty, car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Etna C. B." Cyrus Ellison, President; S. B. Stuce, Vice-President; Thomas McGovney, Secretary and Treasurer; A. T. Dempsey, Furnace Manager. *See Hanging Rock Bituminous Furnaces.*

Hamden Furnace, Damarin & Co., Portsmouth, Scioto county. Furnace at Hamden Junction P. O., Vinton county. One stack, 34 x 11, built in 1854; hot blast; open top; limestone ore from furnace lands; product, strong foundry pig iron, especially adapted for machinery; annual capacity, 4,000 net tons.

Hecla Furnace, Hecla Iron and Mining Company, Ironton, Lawrence county. Principal office at Hecla Furnace. One stack, 32½ x 11, built in 1833; cold blast; open top; product, car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Hecla." John Campbell, President; Charles Campbell, Secretary and Treasurer; J. D. Foster, Superintendent. Sales agents, Collard & Martin, Pittsburgh; J. J. McDowell & Co.,

- St. Louis ; Geo. S. Moore & Co., Louisville ; Rogers, Brown & Co., Cincinnati.
- Howard Furnace, Albert Campbell, lessee, Lyra P. O., Scioto county. One stack, 36 x 10½, built in 1853 ; open top ; hot or cold blast ; ores, local yellow kidney, limestone, and red block ; product, foundry pig iron ; annual capacity, 3,500 net tons. Brand, "Pine Creek." Benjamin Humphreys, Manager.
- Jefferson Furnace, Jefferson Furnace Company, Oak Hill, Jackson county. One stack, 40 x 11½, built in 1854 ; open top ; cold blast ; ore, local limestone ; product, pig iron suitable for car-wheels and machinery ; annual capacity, 3,000 net tons. Joseph J. Jones, Secretary ; Eben J. Jones, Treasurer ; J. D. Davis, Superintendent.
- Lawrence Furnace, Lawrence Furnace Company, Culbertson, Lawrence county. One stack, 34 x 10, built in 1834 ; cold blast ; open top ; ore, native limestone ; product, car-wheel pig iron ; annual capacity, 4,500 net tons. George Peters, President, Treasurer, and Manager ; Charles Peters, Secretary ; W. H. Peters, Vice-President.
- Madison Furnace, Clare, Duduit & Co., Rempel, Jackson county. One stack, 37 x 9½, built in 1854 ; hot blast ; open top ; native limestone red ore ; product, No. 1 foundry pig iron ; annual capacity, 3,500 net tons. J. D. Clare, President and Secretary ; F. E. Duduit, Vice-President, Treasurer, and Manager.
- Monitor Furnace, Car-wheel Iron Company, Ironton, Lawrence county. Furnace at Petersburg. One stack, 35 x 9½, built in 1868 ; open top ; hot or cold blast ; limestone ore ; product, car-wheel iron ; annual capacity, 2,000 net tons. John Peters, President ; J. F. Peters, Secretary and Treasurer, Ironton ; John Peters, Jr., Manager.
- Monroe Furnace, Union Iron Company, Wm. N. McGugin, Receiver, Samsonville, Jackson county. Furnace in Jackson county. One stack, 40 x 12, built in 1856 ; hot blast ; open top ; ore, native limonite ; product, principally foundry pig iron ; annual capacity, 5,000 net tons. Selling agents, Matthew Addy & Co., Cincinnati. *See Hanging Rock Bituminous Furnaces.*
- Mount Vernon Furnace, H. Campbell & Sons, Ironton, Lawrence county. One stack, 32 x 10, built in 1833 ; open top ; ore, native hematite ; product, warm-blast car-wheel iron ; annual capacity, 4,400 net tons. Brand, "Mt. Vernon." John W. Campbell, Manager. Selling agents, J. Traber & Co., Cincinnati. *See Hanging Rock Bituminous Furnaces.*
- Pine Grove Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 36 x 12, built in 1829, and rebuilt in 1844 ; open top ; hot blast ; limestone ore ; product, principally foundry pig iron ; annual capacity, 5,500 net tons. Thomas W. Means, President ; E. B. Willard, Secretary and Treasurer ; A. R. Mackintosh, Manager. Selling agents, Rogers, Brown & Co., Cincinnati ; Collard & Martin, Pittsburgh. Ohio Furnace, in Scioto county, 36 x 11½, built in 1845, has been abandoned. *See Hanging Rock Bituminous Furnaces.*
- Richland Furnace, Richland Furnace Company, Richland, Vinton coun-

- ty. One stack, 40 x 10½, built in 1854; open top; hot blast; annual capacity, 4,000 net tons. Formerly called Cincinnati Furnace. I. Lord, President; Wm. Poland, Treasurer, Chillicothe; A. J. Smart, Secretary, Greenfield.
- Scioto Furnace, L. C. Robinson & Co., Portsmouth, Scioto county. One stack, 32 x 10½, built in 1844; open top; hot blast; annual capacity, 4,000 net tons.
- Total number of charcoal furnaces in Hanging Rock region of Ohio: 19 stacks. The Hanging Rock charcoal furnaces generally stop on Sunday, as do also some of the bituminous furnaces.

HANGING ROCK—BITUMINOUS COAL OR COKE.

- Belfont Furnace, Belfont Iron Works Company, Ironton, Lawrence county. One stack, 66 x 16, built in 1868; closed top; fuel, Connellsville coke and Kanawha coal; ores, Missouri and native; product, forge pig iron for nails; annual capacity, 15,000 net tons. *See Rolling Mills.*
- Eliza Furnace, Eliza Furnace and Coal Company, Wellston, Jackson county. One stack, 50 x 13, built in 1877 from material of the abandoned Ophir Furnace, and blown in October 30, 1877; rebuilt in 1881, and remodeled in 1884; closed top; fuel, raw coal; ores, native block and limestone; product, foundry pig iron; annual capacity, 8,000 net tons. H. S. Bundy, President. E. L. Harper & Co., sales agents, Cincinnati.
- Etna Iron Works, Ironton. Two stacks: Alice, 86 x 18, first blown in September 13, 1875; closed top; four Whitwell hot-blast stoves; ores, native, Virginia, Kentucky, and Missouri; product, mostly foundry pig iron; annual capacity, 26,000 net tons. Brand, "Alice." Blanche, 86 x 18, nearly finished, to mate the Alice. Cyrus Ellison, President; S. B. Stuce, Vice-President; Thomas McGovney, Secretary and Treasurer; H. R. Brown, Furnace Manager. Selling agents, A. Pleumer & Co., Cincinnati. *See Hanging Rock Charcoal Furnaces.*
- Fulton Furnace, Globe Iron Company, Jackson, Jackson county. One stack, 50 x 11½, built in 1868; closed top; fuel, raw coal; ore, native; annual capacity, 4,000 net tons.
- Hamilton Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county. One stack, 65 x 16, built in 1883; three Whitwell fire-brick hot-blast stoves; closed top; fuel, Kanawha and Connellsville (Pa.) coke; ores, mostly native; annual capacity, 15,000 net tons. Brand, "Hamilton." Thomas W. Means, President; E. B. Willard, Secretary and Treasurer. Selling agents, Rogers, Brown & Co., Cincinnati. *See Hanging Rock Charcoal Furnaces.*
- Huron Furnace, Huron Iron Company, E. T. Jones, Receiver, Jackson, Jackson county. One stack, 49 x 13, first blown in April 19, 1875; closed top; annual capacity, 5,000 net tons.
- Ironton Furnace, New York and Ohio Iron and Steel Company, Ironton, Lawrence county. One stack, 58 x 16, built in 1873-4; three Player

hot-blast stoves; closed top; fuel, Pa. and West Va. coke; ores from Ohio, West Va., and Missouri; product, mill pig iron; annual capacity, 15,000 net tons. Brand, "Ironton." B. M. Caldwell, Superintendent. *See Rolling Mills.*

Milton Furnace, Milton Furnace and Coal Company, Wellston, Jackson county. One stack, 60 x 13½, built in 1873-4; put in blast June 6, 1874; Whitwell hot-blast stoves; closed top; fuel, raw coal; ore, Hanging Rock limestone; product, soft, open-grained, foundry pig iron, known as "American Scotch;" annual capacity, 8,000 net tons. H. S. Willard, President and Superintendent; J. E. Ferree, Secretary. Sarah Furnace, H. Campbell & Sons, Ironton, Lawrence county. One stack, 50 x 14, built in 1877; blown in March 18, 1878; three Whitwell hot-blast stoves; closed top; fuel, Virginia and Connellsville (Pa.) coke; ore, native hematite; product, foundry and mill pig iron; specialty, No. 1 "Sarah" foundry; annual capacity, 10,000 net tons. J. H. Campbell, Manager. Selling agents, J. Traber & Co., Cincinnati. *See Hanging Rock Charcoal Furnaces.*

Star Furnace, Star Furnace Company, Jackson, Jackson county. One stack, 54 x 14, built in 1866, and rebuilt in 1879; bell-and-hopper top; fuel, ¾ native raw coal and ¼ West Va. coke; ores, native limonite and block; product, Nos. 1 and 2 silver gray foundry and gray mill irons; annual capacity, 9,000 net tons. Isaac Brown, President; B. Kahn, Secretary; L. V. Brown, Manager. Selling agents, J. Traber & Co., Cincinnati, and Rhodes & Co., Cleveland.

Tropic Furnace, Tropic Furnace Company, Jackson, Jackson county. One stack, 47 x 13, built in 1872-3, and rebuilt in 1879; closed top; hot blast; fuel, raw coal; ores, native limestone and block; product, foundry and mill pig iron; annual capacity, 6,000 net tons. H. L. Chapman, President; J. C. Jones, Secretary and Treasurer; Miles Jones, Superintendent.

Vinton Furnace, Vinton Coal and Iron Company, Vinton Station, Vinton county. One stack, 50 x 11, built in 1854; closed top; annual capacity, 6,000 net tons. Has not been in blast for many years. For lease; address S. R. Snyder, 525 Market st., Philadelphia.

Washington Furnace, Union Iron Company, Wm. N. McGugin, Receiver, Samsonville, Jackson county. Furnace in Lawrence county. One stack, 50 x 13, built in 1853; altered from charcoal to bituminous coal in 1877; closed top; annual capacity, 5,000 net tons. *See Hanging Rock Charcoal Furnaces.*

Wellston Furnace, Wellston Coal and Iron Company, Wellston, Jackson county. One stack, 52 x 13, built in 1874-5; remodeled in 1879; bell top; ores, ¾ native and ¼ Lake Superior; product, neutral foundry pig iron; annual capacity, 7,300 net tons. Allen Hegler, President; I. S. Willett, Secretary and Treasurer; F. L. Nitterhouse, Vice-President. Selling agents, Rogers, Brown & Co., Cincinnati.

Number of bituminous furnaces in Hanging Rock region of Ohio: 15 stacks.

MAHONING VALLEY—BITUMINOUS COAL OR COKE.

Brier Hill Iron and Coal Company, Youngstown, Mahoning county.

Four stacks: Brier Hill Furnace, 66 x 14½, built in 1846, and rebuilt in 1879; product, Bessemer and strong foundry pig iron. Grace Furnace No. 1, 80 x 18, built in 1860, torn down in 1873, and rebuilt in 1882. Grace Furnace No. 2, 57 x 17½, built in 1861; specialty, Bessemer pig iron. Tod Furnace, 45 x 10½, built in 1880; product, spiegel and foundry pig iron. All have closed tops; fuel, coke and raw coal; ores, Lake Superior and blackband; total annual capacity, 100,000 net tons. Brands, "Brier Hill" for Bessemer and "Grace" and "Tod" for foundry. John Stambaugh, President; W. B. Schiller, Secretary; H. H. Stambaugh, Treasurer; J. G. Butler, Jr., General Manager.

Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Three stacks: Falcon and Phoenix Furnaces at Youngstown and Anna Furnace at Struthers Station. Falcon Furnace, 55 x 12½, built about 1850; Phoenix Furnace, 60 x 15, built in 1854; and Anna Furnace, 74½ x 16, built in 1869; rebuilt in 1881; closed tops; ore, Lake Superior; fuel, block coal and Connellsville coke; product, foundry and mill pig iron; total annual capacity, 64,000 net tons. D. B. Chambers, Receiver's Agent; John I. Williams, General Manager. *See Rolling Mills.*

Eagle Furnace, Eagle Furnace Company, Youngstown, Mahoning county. One stack, 51 x 14, built in 1846; closed top; three iron hot-blast stoves; fuel, raw coal and Connellsville coke; ore, Lake Superior; product, principally mill pig iron for Cartwright, McCurdy & Co.; annual capacity, 20,000 net tons. M. C. Wick, President; H. O. Bonnell, Vice-President; W. E. Taylor, Secretary and Treasurer.

Girard Furnace, Girard Iron Company, Girard, Trumbull county. One stack, 66 x 16, built in 1866, and remodeled in 1879; closed top; three Pollock improved hot-blast stoves; fuel, Connellsville coke exclusively; ore, Lake Superior; product, mill and foundry pig iron; annual capacity, 30,000 net tons. Brand, "Girard." Henry B. Shields, Manager. The company intends to increase the height of the furnace by 9 feet.

Hannah Furnace, Mahoning Valley Iron Company, Youngstown. One stack, 66½ x 16, first put in blast June 14, 1880; built mainly of material composing Elizabeth Furnace, erected at Niles in 1859; closed top; two iron hot-blast stoves; fuel, Connellsville coke and native block coal; ore, Lake Superior; product, mill pig iron, all used in the company's mill; annual capacity, 30,000 net tons. Thos. H. Pollock, Manager. *See Rolling Mills.*

Haselton Furnaces, Andrews Brothers & Co., Haselton, Mahoning county. Branch office at Youngstown. Two stacks, 75 x 18 and 56 x 13½, built in 1867 and 1868; the larger one was rebuilt in 1880 and 1881; fuel, block coal and coke; closed tops; product, foundry and mill pig iron from Lake Superior ores, and "American Scotch" pig iron from a blackband ore obtained at Mineral ridge, 12 miles from

the furnaces; total annual capacity, 36,000 net tons. Brand, "Haselton." *See Rolling Mills.*

Himrod Furnaces, Himrod Furnace Company, Youngstown, Mahoning county. Two stacks, 70 x 15 and 70 x 16, built in 1859 and 1860, and rebuilt in 1876; fuel, Connellsville coke; ores from Menominee district, Lake Superior, and from Lawrence county, Pa., making soft foundry and neutral mill iron; closed tops; annual capacity, No. 1, 30,000 net tons; No. 2, 35,000 net tons. Another stack, 48 x 13, built in 1868, has been virtually abandoned until it can be rebuilt. Brand, "Himrod." R. A. Wight, President, and Robert Kelly, Secretary, P. O. Box 157, New York; and A. B. Cornell, Treasurer and Manager, Youngstown, Ohio.

Hubbard Furnaces, Andrews & Hitchcock, Youngstown, Mahoning county. Works at Hubbard, Trumbull county. Two stacks, one 75 x 16 and one 60 x 16, built in 1867 and 1872; one rebuilt in 1883; fuel, Connellsville coke; product, principally foundry pig iron. "Hubbard strong foundry" is made of a mixture of Lake Superior specular and magnetic ores; "Hubbard Scotch" is made from $\frac{1}{2}$ Trumbull county blackband ores and $\frac{1}{2}$ Lake Superior ore, and sells in place of Scotch pig iron. Total annual capacity, 62,000 net tons.

Mary Furnace, Ohio Iron and Steel Company, Lowellville, Mahoning county. One stack, 75 x 15, built in 1845; rebuilt of iron in 1872, and remodeled and enlarged in 1883; closed top; iron casting house; two iron hot-blast stoves; fuel, Connellsville coke; ores, Lake Superior and native blackband; product, strong neutral foundry pig iron; annual capacity, 41,000 net tons. Brands, "The Mary" and "Ohio Scotch." Formerly called Ada Furnace. Thomas H. Wells, President; Henry Wick, Vice-President; Robert Bentley, Secretary and Treasurer.

Thomas Furnace, Thomas Furnace Company, Niles, Trumbull county. One stack, 71 x 16, built in 1870, and enlarged to its present dimensions in 1883; closed top; two Pollock hot-blast stoves; fuel, block coal and Connellsville coke; ores, Mineral ridge blackband and Lake Superior; annual capacity, 25,000 net tons. Brand, "Niles." J. R. Thomas, Manager. The company contemplates erecting one Pollock improved hot-blast at an early day, which will increase the capacity of the furnace to 100 tons per day.

Number of bituminous furnaces in the Mahoning valley: 18 stacks.

HOCKING VALLEY—BITUMINOUS COAL OR COKE.

Baird Furnace, Baird Iron Company, Gore, Hocking county. Furnace in Perry county. One stack, 44 x 12, built in 1874-5, and blown in October 9, 1875; closed top; two iron hot-blast stoves; fuel, raw splint coal; ore, native limestone; product, strong No. 1 foundry pig iron; annual capacity, 6,100 net tons. Brand, "Baird." F. B. Baird, President and Treasurer; C. F. Eisele, Secretary; Henry Davis, Manager. Selling agents, King, Gilbert & Warner, Columbus, Ohio.

Columbus and Hocking Coal and Iron Company, Columbus. Five com-

pleted stacks: Akron Furnace, at Buchtel, Athens county, one stack, 60 x 16, built at Akron in 1872, removed to Buchtel in 1877, and blown in November 30, 1877; closed top. Bessie Furnace, at New Straitsville, Perry county, one stack, 60 x 14, built in 1877-8, and blown in January 21, 1878; four Whitwell hot-blast stoves, each 36 x 15. Crafts Furnace, at Greendale, Hocking county, one stack, 58 x 15, first put in blast November 8, 1879; closed top. The machinery of this furnace was formerly used at Kenton Furnace, at Newport, Kentucky, dismantled in 1877. Gore Furnace, at Gore, Hocking county, one stack, 58 x 13, built in 1876; blown in December 8, 1876. Winona Furnace, at Winona Furnace P. O., Hocking county, one stack, 50 x 12½, completed and blown in February 20, 1878; three Whitwell hot-blast stoves; closed top. Fuel, raw bituminous coal, obtained from the company's mines near the furnaces; ores, native and Lake Superior; product, foundry pig iron; total annual capacity, 90,000 net tons. Samuel Thomas, President; J. R. Buchtel, Walter Crafts, and T. Longstreth, Vice-Presidents; S. Churchill, Treasurer; H. D. Turney, Secretary; H. F. Holloway, Assistant Secretary.

Fannie Furnaces, Licking Iron Company, Newark, Licking county. Furnaces at Shawnee, Perry county. Two stacks: No. 1, 50 x 12, built in 1874-5 at Newark, removed to Shawnee in 1876, and blown in on September 15, 1876; No. 2, 50 x 13, first put in blast October 10, 1877; extensive improvements made in 1884; added a Thomas hot-blast stove, 31 x 21; closed tops; combined annual capacity, 13,000 net tons; ore, Lake Superior; product, American Scotch foundry pig iron. Brand, "Fannie." John C. Hamilton, President; E. Snowden, Secretary and Treasurer; Jacob H. Opperman, Superintendent. E. L. Harper & Co., Cincinnati, sole sales agents.

Franklin Furnace, King, Gilbert & Warner, lessees, Columbus, Franklin county. One stack, 64 x 15, completed in November, 1873; rebuilt in 1884; closed top; three iron hot-blast stoves; fuel, West Va. coke; ores, local limestone and Lake Superior; product, strong foundry pig iron; annual capacity, 20,000 net tons. Brand, "Franklin."

Mollie Furnace, New York and Straitsville Coal and Iron Company, Shawnee, Perry county. One stack, 50 x 14½, built in 1877, and blown in November 10, 1877; hot blast; open top; product, No. 1 foundry pig iron; annual capacity, 10,000 net tons.

Moxahala Furnace, Moxahala Iron Company, Moxahala, Perry county. One stack, 55½ x 15, built in 1877-8, and blown in January 5, 1878; closed top.

Standard Coal and Iron Company, H. C. Stanwood, Assignee, Columbus. Three completed stacks and two stacks building: Buchtel Furnaces, at Floodwood, Athens county, two stacks, each 60 x 16, building. Helen Furnace, at Orbiston, Hocking county, one stack, 52 x 15, built in 1877, and blown in in December, 1877. Lee Furnace, at Monday, Hocking county, one stack, 52½ x 14, built in 1877-8, and blown in in March, 1878. XX Furnace, at Shawnee, Perry county, one stack, 50 x 14, built

in 1876-7, and blown in January 18, 1877. Fuel used is mainly raw coal, mixed with some coke; ores, native limestone, with some Lake Superior; product, principally foundry pig iron.

Number of bituminous furnaces in the Hocking valley: 14 completed stacks, and 2 stacks building.

MISCELLANEOUS BITUMINOUS—EASTERN OHIO AND CLEVELAND.

Bellaire Nail Works, Bellaire, Belmont county. One stack, 65 x 14, built in 1873; put in blast September 22, 1873; closed top; fuel, Connellsville coke; ore, Lake Superior; product, Bessemer pig iron, consumed in the manufacture of steel for nails; annual capacity, 20,000 net tons. Edward Jones, Jr., Manager. *See Rolling Mills.*

Benwood Iron Works, Wheeling, West Virginia. Furnace at Martinsville, Belmont county, Ohio. One stack, 51 x 14, built in 1866; fuel, Connellsville coke; ore, Lake Superior; product, mill pig iron, consumed in the manufacture of nails; annual capacity, 20,000 net tons. *See West Virginia Rolling Mills.*

Cherry Valley Furnaces, Cherry Valley Iron Works, Leetonia, Columbiana county. Two stacks: No. 1, 55 x 14, built in 1867; and No. 2, 75 x 16, built in 1868, and rebuilt in 1883; closed tops; fuel, coke and raw coal; ores, native and Lake Superior mixed; specialty, "American Scotch" foundry pig iron; total annual capacity, 33,000 net tons. Brand, "Cherry Valley." J. H. King, President; C. N. Schmick, Secretary and Treasurer; J. G. Chamberlain, Superintendent. Selling agents, King, Gilbert & Warner, Columbus. *See Rolling Mills.*

Cleveland Rolling Mill Company, Cleveland, Cuyahoga county. Three stacks: Proton Furnace, formerly operated by the Cleveland Iron Company, 60 x 16, built in 1869, and rebuilt in 1878. The second stack, 70 x 17, built near Proton Furnace in 1879, and blown in October 15, 1879. Central Furnace, 75 x 20, built in 1881-2; Whitwell stoves. Fuel, raw coal and coke; ores, Lake Superior and Canadian; product, No. 1 Bessemer pig iron; total annual capacity, 135,000 net tons. Newburgh Furnaces, two stacks, built in 1864 and 1872, abandoned and torn down in 1884. *See Rolling Mills.*

Dover Furnace, Penn Iron and Coal Company, Canal Dover, Tuscarawas county. One stack, 66 x 15, built in 1854; rebuilt in 1878-9; closed top; three iron hot-blast stoves; fuel, raw coal and Connellsville coke; ores, native, analyzing 40 per cent., with mixture of Lake Superior; product, foundry pig iron; annual capacity, 15,000 net tons. This furnace was built to take the place of Fairfield Furnace, 45 x 14, built in 1854; torn down in 1878. J. P. Burton, President, Massillon, Ohio; E. M. Davis, Vice-President, Philadelphia; S. W. Croxton, Treasurer and General Manager, Canal Dover; H. S. Ream, Secretary; George Pugh, Furnace Manager. Selling agents, Rhodes & Co., Cleveland.

Emma Furnace, Union Rolling Mill Company, Cleveland, Cuyahoga county. One stack, 80 x 16, built in 1872, and remodeled in 1882-3; closed top; fuel, Connellsville coke; ore, Lake Superior; product,

forge and foundry pig iron; annual capacity, 35,000 net tons. Brand, "Emma." *See Rolling Mills.*

Graffton Furnaces, Graffton Iron Company, Leetonia, Columbiana county. Two stacks, 53 x 13 and 53 x 15, built in 1866 and 1872; fuel, coke; ore, Lake Superior; product, foundry and forge pig iron. Office, 97 Water st., Pittsburgh: John Graff, President.

Jefferson Iron Works, Steubenville, Jefferson county. Two stacks, each 56 x 13, built in 1863 and 1865, and rebuilt in 1877; closed tops; fuel, Connellsville (Pa.) and Steubenville (O.) coke; ores, Missouri and Lake Superior; specialty, gray forge pig iron; total annual capacity, 28,000 net tons. Brand, "Jefferson." Pig iron generally sold by the company or used at the mill; some sold by Nimick & Co. and John B. Herron, Pittsburgh. *See Rolling Mills.*

Mingo Furnaces, Junction Iron Company, Mingo Junction, Jefferson county. Two stacks: No. 1, called Sidney Furnace, 60 x 14, built in 1871; No. 2, called Estella Furnace, 60 x 16½, built in 1872 and first put in blast in May, 1873; closed tops; fuel, Connellsville coke; ore, Lake Superior; product, foundry and mill pig iron; total annual capacity, 62,000 net tons. Brands, "Mingo" and "Stella." George A. Dean, foundryman. *See Rolling Mills.*

Steubenville Furnace, Cleveland Furnace Company, lessee, Cleveland. Furnace at Steubenville, Jefferson county. One stack, 60 x 16, built in 1872, and blown in in December, 1872; closed top; fuel, native and Connellsville coke; ore, Lake Superior; specialty, mill and foundry pig iron; estimated annual capacity, 20,000 net tons. F. A. Bates, President.

Zanesville Furnace, Ohio Iron Company, Zanesville, Muskingum county. One stack, 75 x 15½, built in 1870-1; blown in September 7, 1871; rebuilt in 1883; three Whitwell fire-brick hot-blast stoves, 65 x 17; two blowing engines; fuel, raw coal and Connellsville coke; ore, Lake Superior; product, forge and foundry pig iron; annual capacity, 34,000 net tons. *See Rolling Mills.*

Number of bituminous coal or coke furnaces in Ohio outside of the Hanging Rock, Mahoning Valley, and Hocking Valley districts: 17 stacks.

NORTHWESTERN—CHARCOAL.

Maumee Furnace, Antwerp, Paulding county. One stack, 42 x 8½, built in 1865; ore, Lake Superior; product, principally car-wheel pig iron. Idle. Thomas Fitzsimons, General Manager.

Paulding Furnace, Paulding Iron Company Limited, lessee, Cecil, Paulding county. One stack, 42 x 10, built in 1865; hot blast; closed top; ore, Lake Superior; specialty, car-wheel pig iron; annual capacity, 10,000 net tons. James I. Bennett, Chairman; J. H. King, Treasurer; S. Frank Eagle, Secretary and Superintendent. *See Bloomaries.*

Number of charcoal furnaces in Ohio outside of Hanging Rock region: 2 stacks. Total number of furnaces in Ohio: 85 completed stacks, and 2 stacks building.

INDIANA.

BITUMINOUS BLOCK COAL.

Brazil Furnace, Central Iron and Steel Company, Brazil, Clay county.

One stack, 60 x 13, built in 1867, and blown in in December, 1867; closed top; fuel, block coal; ores, Lake Superior and Iron Mountain; specialty, forge pig iron; annual capacity, 10,000 net tons. Brand, "Brazil." Major Collins, President; Charles Minshall, Secretary and Treasurer. *See Rolling Mills.*

Vigo Furnace, Vigo Iron Company, Terre Haute, Vigo county. One stack, 52 x 12, built in 1872, and blown in in 1873; closed top; fuel, raw coal; ore, Missouri; specialty, forge pig iron; annual capacity, 8,000 net tons. Brand, "Vigo." The No. 1 furnace, built in 1869, was torn down in 1882 and removed to Alabama. A. L. Crawford, President; A. J. Crawford, Secretary, Treasurer, and Manager.

Number of bituminous furnaces in Indiana: 2 stacks.

CHARCOAL.

Nelson Furnace, Nelson Fordice, Shoals, Martin county. One stack, 60 x 13, built in 1872; hot blast; closed top; ores, $\frac{2}{3}$ native to $\frac{1}{3}$ Missouri; annual capacity, 7,000 net tons. Has been out of blast since 1880.

Number of charcoal furnaces in Indiana: 1 stack. Total number of furnaces in Indiana: 3 stacks.

ILLINOIS.

BITUMINOUS COAL OR COKE.

Big Muddy Furnace, Lewis Iron Company, 217 Olive st., St. Louis, Mo.

Furnace at Grand Tower, Jackson county. One stack, 69 x 17, built in 1871; weekly capacity, 315 net tons. B. W. Lewis, President; William Spear, Secretary and Treasurer.

Calumet Furnace, Calumet Iron and Steel Company, First National Bank Building, Chicago. Works at Cummings, Cook county. One stack, 75 x 18, built in 1880; closed top; three Siemens-Cowper-Cochrane fire-brick stoves; fuel, Connellsville coke and Brazil coal; ores, Lake Superior and Menominee; product, foundry and mill pig iron; annual capacity, 35,000 net tons. Brand, "Calumet." Works formerly owned by Joseph H. Brown Iron and Steel Company. *See Rolling Mills.*

Joliet Steel Company, Honore Building, Chicago. Two stacks: Ethel Furnaces No. 1 and No. 2, at Joliet, Will county, each 72 x 20, built in 1873. No. 1 first put in blast in June, 1880, and No. 2 first put in blast in January, 1882; closed tops; five iron and three Siemens-Cowper-Cochrane fire-brick stoves. Two additional stacks, No. 3 and No. 4, at Chicago, built in 1881 and 1882, are leased from the Union Steel Company. Fuel, Connellsville coke; ores, Lake Superior and Missouri; product, Bessemer pig iron; total annual capacity, 200,000 net tons. *See Rolling Mills.*

Meier Furnaces, Meier Iron Company, 102 North Main st., St. Louis. Furnaces at Bessemer Station, near East Carondelet, St. Clair county.

Two stacks, each 60 x 17, built in 1873-5, but blown in for the first time in 1880; eight Whitwell hot-blast stoves; closed tops; total annual capacity, 56,000 net tons. Adolphus Meier, President; Theodore G. Meier, Vice-President; John W. Meier, Secretary. Formerly leased by the Missouri Furnace Company.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Cook county. Six stacks in Illinois: Chicago Furnaces, located at Chicago, on north branch of Chicago river, at the foot of Waubansia avenue, have two stacks, (Nos. 1 and 2,) each 66 x 17, built in 1869. South Chicago Furnaces, located at South Chicago, have four stacks, (Nos. 5, 6, 7, and 8,) each 75 x 21, built in 1880-1, two of which were put in blast in 1881, and two were put in blast in 1882. All have closed tops; fuel, coke; ore, Lake Superior; product, Bessemer and mill pig iron; annual capacity of Chicago Furnaces, 55,000 net tons, and of South Chicago Furnaces, 224,000 net tons. *See Wisconsin Furnaces. See Rolling Mills in Illinois and Wisconsin.*

Union Steel Company, 38 Portland Block, Chicago. Four stacks: Two, each 60 x 14½, built in 1869; Whitwell fire-brick stoves; closed tops; fuel, Connellsville coke and Indiana coal; ore, Lake Superior; specialty, Bessemer pig iron. Two stacks, 74 x 16, built in 1881 and 1882, have been leased by the Joliet Steel Company; six Whitwell stoves, *See Rolling Mills.*

Total number of furnaces in Illinois: 16 bituminous stacks.

MISSOURI.

BITUMINOUS COAL OR COKE.

Jupiter Iron Works, Jupiter Furnace Company, St. Louis, St. Louis county. Works at South St. Louis. One stack, 75 x 20, finished in 1873; blown in for the first time in 1880; fuel, coke; ores, Iron Mountain and Pilot Knob and about ¼ red hematite; annual capacity, 33,000 net tons. D. R. Garrison, President; O. A. Hart, Vice-President; W. O. Garrison, Secretary.

Missouri Furnaces, Missouri Furnace Company, Gay Building, 204 North Third st., St. Louis. Two stacks, each 56 x 15, built in 1870; closed tops; four iron hot-blast stoves; fuel, Connellsville coke; ores, Iron Mountain, Shepherd Mountain, Pilot Knob, and Southwest; product, mainly Bessemer pig iron; total annual capacity, 40,000 net tons. Brand, "Missouri." Oliver B. Filley, President; Edwin C. Cushman, Vice-President; Charles A. McNair, Secretary.

South St. Louis Furnaces, St. Louis. Two stacks, each 56 x 15, built in 1870 and 1872; closed tops; fuel, Connellsville coke; specialty, Bessemer pig iron; total annual capacity, 40,000 net tons. Formerly leased by the Missouri Furnace Company.

St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer Building, corner Broadway and Locust sts., St. Louis. Works at South St. Louis. Three stacks: two, 60 x 14 and 60 x 15, built in 1869; one, 65 x 16, finished in 1872; closed tops; fuel, Connellsville (Pa.) and

Grand Tower (Ill.) coke ; ore, Pilot Knob ; product, Bessemer pig iron ; total annual capacity, 55,000 net tons. E. L. Goldstein, Manager. *See Pilot Knob-Furnace. See Rolling Mills.*

Number of bituminous furnaces in Missouri : 8 stacks.

CHARCOAL.

Hamilton Furnace, Henry R. Tracy, Portsmouth, Ohio. Furnace at Sullivan, Franklin county. One stack, 40 x 9½, built in 1873 ; put in blast October 22, 1873 ; open top ; ores mined on the furnace property, consisting of 7,000 acres of good timber land ; hot blast ; daily capacity, 25 net tons of Bessemer or malleable pig iron. For sale.

Irondale Furnace, E. Harrison & Co., Irondale, Washington county. Office, 322 Pine st., St. Louis. One stack, 38 x 10, built in 1859 ; hot blast ; open top ; annual capacity, 9,500 net tons. Edwin Harrison, General Manager, St. Louis. For sale, with 10,500 acres of land, half of which is well timbered, also 600 acres of meadow and pasture land under fence. A copious supply of water from springs higher than the furnace gives a natural head of water.

Knotwell Furnace, Knotwell Iron Company, Newburg, Phelps county. One stack, 40½ x 10, built in 1873-4, and blown in June 10, 1874 ; warm blast ; open top ; ores, blue specular and red hematite, from mines in the neighborhood ; product, foundry pig iron ; annual capacity, 7,500 net tons. Brand, "Knotwell." H. R. Knotwell, President and Manager ; T. D. Smith, Secretary and Treasurer.

Maramec Iron Works, Maramec Iron Company, Maramec Iron Works P. O., Phelps county. One stack, 34 x 9½, built in 1826, and rebuilt in 1851 ; open top ; cold blast ; water-power ; ores, blue specular and red oxide, mined near the furnace ; specialty, car-wheel pig iron ; annual capacity, 5,000 net tons. Brand, "Maramec." Out of blast since 1876. John L. Cochran, President, Charlottesville, Va. ; Samuel P. Thompson, Secretary and Treasurer, Baltimore, Md. Wm. James, Agent, St. James, Phelps county. *See Bloomaries.*

Midland Furnace, Midland Blast-Furnace Company, Midland, Crawford county. Main office, 411 Olive st., St. Louis. One stack, 50 x 10, built in 1874-5, and blown in April 10, 1875 ; rebuilt in 1877 ; closed top ; either cold or hot blast ; ore, red, blue, and brown hematite ; product, Bessemer, foundry, and malleable pig iron ; annual capacity, 15,000 net tons. This furnace stack is wholly built of fire-brick, 22½ inches thick. Brand, "Midland." Wm. H. Lee, President ; E. A. Hitchcock, Vice-President ; T. F. Turner, Secretary ; B. B. Reagan, Superintendent.

Moselle Furnace, Moselle Iron Company, Moselle, Franklin county. One stack, 39 x 9½, built in 1867 ; warm and hot blast ; open top ; ores, red hematite and blue specular, with a small mixture of brown hematite ; product, soft and strong foundry and Bessemer pig iron ; annual capacity, 6,000 net tons. Has not been in blast since 1876. Joseph H. Brown, Vice-President, and J. Craig Smith, Manager and Treasurer, Youngstown, Ohio. For sale.

Nova Scotia Furnace, Nova Scotia Iron Company, Salem, Dent county.

One stack, 55 x 11, built in 1880-1, and blown in in 1882; hot blast; closed top; ore, local red hematite; annual capacity, 15,000 net tons; specialty, foundry and Bessemer pig iron. Frederick Shickle, President; John W. Harrison, Vice-President; E. C. Lackland, Secretary; Thomas J. Scott, Manager.

Pilot Knob Furnace, St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer Building, corner Broadway and Locust sts., St. Louis. Furnace at Pilot Knob, Iron county. One stack, 60 x 11, built in 1848; remodeled in 1879; ore, Pilot Knob; product, Bessemer pig iron; annual capacity, 12,000 net tons. J. C. Simpson, Manager. *See St. Louis Ore and Steel Company's Furnaces. See Rolling Mills.*

Sligo Furnace Company, Sligo Furnace P. O., Dent county. General office, 411 North Third st., St. Louis. One stack, 55 x 11, built in 1880, and first put in blast in October, 1880; closed top; hot blast; ores, blue specular and red oxide, mined near the furnace; specialty, Bessemer pig iron; annual capacity, 18,000 net tons. Brand, "Sligo." Furnace lands comprise 20,000 acres of timber land with several good deposits of ore and limestone. H. A. Crawford, President, Secretary, and Treasurer, St. Louis; A. L. Crawford, Vice-President, New Castle, Pa.; David Carson, Superintendent, Sligo.

Number of charcoal furnaces in Missouri: 9 stacks, of which the Maramec Iron Works are practically abandoned, the machinery having been removed. Total number of furnaces in Missouri: 17 stacks.

MICHIGAN.

CHARCOAL.

Bangor Furnace, Bangor Furnace Company, Bangor, Van Buren county.

One stack, 43 x 10, first blown in October 29, 1872; hot blast; bell-and-hopper top; ore, Lake Superior; product, Bessemer, car-wheel, and malleable pig iron; annual capacity, 15,000 net tons. Chemical works are connected with the charcoal kilns. D. C. Bradley, President.

Deer Lake Furnaces, Deer Lake Company, Ishpeming, Marquette county. Two stacks: one, 47 x 8, built in 1868; the other, 47 x 9, built in 1873, and put in blast in October, 1873; hot blast; steam and water power; product, car-wheel, malleable, and foundry pig iron; total annual capacity, 10,000 net tons. Brand, "Deer Lake." W. H. Rood, President and Treasurer; J. N. St. Clair, Secretary. Selling agents, Charles Himrod & Co., Chicago and Detroit.

Detroit and Lake Superior Iron Manufacturing Company, Detroit, Wayne county. One stone stack, 40 x 9½, built in 1857, and first put in blast March 16, 1857; warm blast; closed top; ores, Lake Superior specular, magnetic, and hematite; the pig iron is specially adapted to malleable castings; annual capacity, 9,000 net tons. Charles A. Kent, President; Wm. H. Barnum, Vice-President; Wm. M. Gaylord, Secretary, Treasurer, and General Manager.

Elk Rapids Furnace, Elk Rapids Iron Company, Elk Rapids, Antrim

- county. Chicago office, 59 Wabash avenue. One stack, 47 x 11½, first put in blast in July, 1873; hot blast; four 4-inch tuyeres; ore, Lake Superior entirely; specialty, Nos. 3 and 4 pig iron for car-wheels and malleable castings; daily average production, 60 net tons. The charcoal for this furnace is made in ten round and twenty-five rectangular brick kilns, holding, respectively, 50 and 100 cords each. Chemical works are connected with them. Brand "Elk Rapids." N. K. Fairbank, President, and F. H. Head, Vice-President, Chicago; E. S. Noble, Secretary, and H. H. Noble, Treasurer and Superintendent, Elk Rapids. Selling agent, F. H. Head, 59 Wabash avenue, Chicago.
- Eureka Furnaces, Eureka Iron and Steel Works, Detroit. Two stacks at Wyandotte: Furnace No. 1, 45 x 9, built in 1855; hot blast; bell-and-hopper top; annual capacity, 13,000 net tons. Is being rebuilt, and when finished will be 50 x 12, and have an annual capacity of 20,000 net tons. Furnace No. 2, 45 x 9½, built in 1862; formerly called Ward Furnace; hot blast; bell-and-hopper top; annual capacity, 13,000 net tons. Ores, Lake Superior and Menominee. Product, Bessemer, car-wheel, and malleable pig iron. *See Rolling Mills.*
- Excelsior Furnace, Carp River Iron Company, Marquette. Furnace at Ishpeming, formerly known as the Peat Furnace, built in 1872, now changed into a charcoal furnace. One stack, 50 x 9, rebuilt in 1879; hot blast; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 8,000 net tons. Name of brands, "Excelsior" and "Carp River." H. A. Burt, President and General Manager; J. F. Taylor, Secretary; A. C. Burt, Treasurer.
- Fayette Furnaces, Jackson Iron Company, Fayette, Delta county. Two stacks, each 40 x 9½, built in 1867 and 1869, and enlarged to 52 x 10 in 1881; hot blast; bell-and-hopper tops; ores, Jackson specular and South Side manganiferous hematite; product, foundry, malleable, and car-wheel pig iron; total annual capacity, 35,000 net tons. Iron is known as "Fayette." These furnaces are 100 miles from the company's mines at Negaunee, and were built at Fayette owing to the abundance of timber. There are 64 charcoal kilns. David Stewart, President, and Gardner P. Lloyd, Secretary and Treasurer, 119 Broadway, New York; Fayette Brown, General Agent, Cleveland, Ohio; H. H. Brown, Assistant General Agent, Cleveland; Henry Merry, Agent, Fayette.
- Frankfort Furnace Company, 32 and 34 Woodward avenue, Detroit. Furnaces at South Frankfort, Benzie county. Two stacks, each 42 x 9½, built in 1870 and 1873; hot blast; bell-and-hopper tops; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; total annual capacity, 27,000 net tons. W. H. Tefft, President and Treasurer; W. H. Irvine, Secretary. Selling agents, Charles Himrod & Co., Chicago and Detroit. New company organized in 1879, and the works put in operation in 1880.
- Hamtramck Furnace, Detroit Iron Furnace Company, Newberry and McMillan Building, Detroit. One stack, 52 x 10½, built in 1870, and

remodeled in 1879; closed top, with Lee Burt's patent charger; hot blast; changed from bituminous coal to charcoal in 1879; ore, Lake Superior; product, car-wheel and malleable pig iron; daily capacity, 56 net tons. Brand, "D. I. F." James McMillan, President; Hugh McMillan, Vice-President and Treasurer; E. C. Wetmore, Secretary; Lee Burt, Manager. Selling agent, R. E. Plumb, 37 Newberry and McMillan Building, Detroit.

Iron River Furnace, Iron River Furnace Company, Fond du Lac, Wisconsin. Building one stack, 56 x 11, at Iron River, Marquette county, Mich., to be completed and put in blast in the fall of 1884; closed top; two iron hot-blast stoves; fuel, charcoal; will use local limonite ore; the product will be foundry pig iron. John S. McDonald, President; Alexander McDonald, Vice-President; John Spence, Secretary; L. Muentner, Treasurer; John T. Jones, Superintendent.

Lake Huron Furnace, Lake Huron Iron Company, Caseville, Huron county. One stack, 45 x 9½, built in 1873, and enlarged to 54 x 9½ in 1881; hot blast; ore, Lake Superior; daily capacity, 35 net tons. A. G. Stone, Vice-President and Treasurer, Cleveland; D. E. Stone, Secretary, Cleveland.

Lawton Furnace, Michigan Central Iron Company, Lawton, Van Buren county. New York address, P. O. Box 1,741. One stack, 40 x 9½, built in 1867; blown in in December, 1867; one Player hot-blast stove; closed top; ore, Lake Superior; product, foundry, malleable, and car-wheel pig iron; annual capacity, 11,000 net tons. Brand, "Lawton." Idle since 1873. For sale or lease. Gen. Q. A. Gillmore, President; D. Van Nostrand, Secretary and Treasurer; Henry Ford, Agent and Manager.

Leland Furnace, Leland Iron Company, 12 and 13 Campan Building, Detroit. Furnace at Leland, Leelenaw county. One stack, 48 x 10, rebuilt in 1872; hot blast; bell-and-hopper top; water-power; ore, Lake Superior; annual capacity, 13,500 net tons. V. K. Moore, President; George W. Moore, Secretary and Treasurer.

Martel Furnace, Davenport, Fairbairn & Co., Erie, Pa. Furnace at St. Ignace, Mackinac county. One stack, 53 x 10½, first put in blast August 15, 1881; closed top; two Whitwell fire-brick hot-blast stoves, each 60 x 15; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 19,000 net tons. Brand, "Martel." The furnace does not run on Sunday. The charcoal for this furnace is made with Mathieu's retorts, and chemical works are connected with them. W. B. Vance, Secretary; John Fairbairn, Manager.

Menominee Furnace, Menominee Furnace Company, Menominee, Menominee county. One stack, 45 x 9½, built in 1872-3; blown in in August, 1873; hot blast; closed top; the ore used is from Lake Superior; annual capacity, 10,000 net tons. A. B. Meeker, President, Chicago, Illinois.

Otis Furnace, John Otis & Co., Mancelona, Antrim county. One stack, 48 x 9, first put in blast December 25, 1882; burned May 29, 1883, and

- rebuilt; hot blast; bell-and-hopper top; ore, Lake Superior; product, car-wheel pig iron; annual capacity, 12,000 net tons. Brand, "Champion."
- Peninsular Furnace, Peninsular Iron Company, Detroit, Wayne county. One stack, $42 \times 9\frac{1}{2}$, built in 1863; put in blast in February, 1864; warm blast; open top, covered by a plate when not filling; ore, exclusively Lake Superior; specialty, car-wheel and malleable pig iron; annual capacity, 10,000 net tons. Brand, "P. I. Co., Det." Supply Chase, President; Theodore H. Ealon, Jr., Vice-President; A. C. Burt, Secretary; Solon Burt, Treasurer and Manager.
- Pine Lake Furnace, Pine Lake Iron Company, Ironton, Charlevoix county. General office, 90 and 92 Dearborn st., Chicago. One stack, $52 \times 10\frac{1}{2}$, built in 1880-1, and put in blast in February, 1881; hot blast; closed top; ore, Lake Superior; specialty, malleable and car-wheel pig iron; estimated annual capacity, 18,000 net tons. Brand, "Champion." R. M. Cherrie, President, and H. C. Dolph, Secretary and Treasurer, 92 Dearborn st., Chicago; M. R. Hunt, Superintendent, Ironton. Sales agents, Cherrie & Co., 92 Dearborn st., Chicago.
- Pioneer Furnaces, Iron Cliffs Company, Negaunee, Marquette county. Two stacks: No. 1, 50×10 , built in 1858; No. 2, 56×9 , built in 1859; both stacks burnt and rebuilt in 1877. Cliffs Furnace has been abandoned. Ores, Lake Superior, $\frac{1}{3}$ red specular and $\frac{2}{3}$ soft hematite; product, Bessemer pig iron; total annual capacity, 20,000 net tons. The height of each furnace will soon be increased by six feet. Brand, "Pioneer." Wm. H. Barnum, President; Charles J. Canda, Treasurer, 52 William st., New York; A. Maitland, General Manager; James Rood, Agent, Chicago.
- Spring Lake Iron Company, Fruitport, Muskegon county. One stack, 46×11 , built in 1879-80; first blown in March 2, 1880; 4 tuyeres; closed top; ore, Lake Superior; product, foundry, car-wheel, and malleable pig iron; annual capacity, 17,500 net tons. Principal office at Milwaukee, Wis.: Samuel Marshall, President; E. H. Brodhead, Vice-President; Irving M. Bean, Secretary and Treasurer. J. C. Ford, Superintendent. Selling agents, Pickands, Brown & Co., 95 Dearborn st., Chicago.
- Union Iron Company, Detroit, Wayne county. One stack, $50 \times 10\frac{1}{2}$, built in 1871-2, and blown in in July, 1872; warm blast; closed top; ore, Lake Superior; specialty, malleable and car-wheel pig iron; annual capacity, 9,000 net tons. Brand, "U. I. Co., Det." Wells Burt, President; Austin Burt, Secretary, Treasurer, and Manager.
- Vulcan Furnace Company, Newberry and McMillan Building, Detroit. Furnace at Newberry, Chippewa county. One stack, $53 \times 10\frac{1}{2}$, built in 1882-3, and blown in in May, 1883; four iron hot-blast stoves; water jackets; closed top, with Lee Burt's patent charger; ore, hard and soft Lake Superior; product, car-wheel, malleable, and Bessemer pig iron; annual capacity, 22,000 net tons. Brand, "D. I. F. V." The charcoal is made in 56 Mathieu's patent retorts, with a daily capacity

of 3,000 bushels. James McMillan, President; John S. Newberry, Vice-President; S. E. Driggs, Secretary; Hugh McMillan, Treasurer; Lee Burt, Manager. Selling agent, R. E. Plumb, 37 Newberry and McMillan Building, Detroit.

Number of charcoal furnaces in Michigan: 26 completed stacks, and 1 stack building.

ANTHRACITE AND BITUMINOUS COAL OR COKE.

Grace Furnace, Kruse & Travers, 88 Washington st., Chicago, Ill. Furnace at Marquette, Marquette county. One stack, 63 x 17, built in 1872; closed top; fuel, mixed anthracite and bituminous coal; annual capacity, 15,000 net tons.

Pacific Furnace, Marquette Furnace Company, Marquette, Marquette county. One stack, 60 x 12, built in 1868; rebuilt in 1873; two iron hot-blast stoves; closed top; fuel, charcoal or coke; product, foundry pig iron; annual capacity, 15,000 net tons. John Burt, President; H. A. Burt, Treasurer and Manager.

Number of anthracite and bituminous coal and coke furnaces in Michigan: 2 stacks. Total number of furnaces in Michigan: 28 stacks, and 1 stack building.

PROJECTED.

C. J. L. Meyer, of Fond du Lac, Wisconsin, contemplates the erection of two charcoal furnaces, each 50 x 9, at Hermansville, Menominee county, Michigan.

WISCONSIN.

CHARCOAL.

Appleton Furnace Company, Appleton, Outagamie county. Two stacks, each 40 x 8½, built in 1871 and 1872; open tops; hot blast; water-power; ore, Lake Superior; product, car-wheel and malleable pig iron; total annual capacity, 14,000 net tons. Brand, "Appleton." Augustus Ledyard Smith, President; Henry A. Foster, Vice-President; Henry D. Smith, Secretary, Treasurer, and General Manager.

Florence Furnace, Florence Furnace Company, Florence, Marinette county. One stack, 40 x 8, commenced June 2, 1881, and completed and blown in November 13, 1881; hot blast; bell-and-hopper top; ore, Menominee Range hematite; specialty, car-wheel pig iron; annual capacity, 6,000 net tons. Brand, "Champion." C. Sprong, President and Manager; H. Duvall, Secretary; H. C. Dolph, Treasurer.

Fond du Lac Furnace, Fond du Lac Iron Company, Fond du Lac, Fond du Lac county. One stack, 52 x 10½, built in 1873-4, and first put in blast in 1883; hot blast; closed top; ore, Lake Superior; annual capacity, 10,000 net tons. J. H. Cooledge, President; A. G. Ruggles, Vice-President; J. B. Perry, Secretary; E. A. Carey, Treasurer and Manager.

Fox River Furnaces, West Depere, Brown county. Two stacks, 40 x 9½ and 50 x 10; one built in 1869, the other built in 1872; put in blast in January, 1873; hot blast; closed tops; ores, from Lake Superior and

Menominee Range; product, Bessemer and foundry pig iron; total annual capacity, 18,500 net tons. Owned by Rogers & Co., Chicago. Green Bay and National Furnaces, National Furnace Company, Depere, Brown county. Two stacks: Green Bay Furnace, at Green Bay, 39 x 9, built in 1870, and put in blast in the spring of 1871; closed top; hot blast; annual capacity, 9,000 net tons. National Furnace, at Depere, 45 x 10½, built in 1869, and put in blast in February, 1870; hot blast; bell-and-hopper top; annual capacity, 13,500 net tons. Ores, Lake Superior and Menominee Range; product, No. 1 foundry pig iron. Brand, "National." One stack, 48 x 12, built in 1872, has been abandoned. Henry D. Smith, President; Eugene Smith, Secretary and Manager; W. L. Brown, Treasurer. Selling agents, Pickands, Brown & Co., Chicago.

Iron Mountain Furnace, North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 37 Mitchell Block, Milwaukee. Furnace at Iron Mountain, Dodge county. One stack, (called No. 10,) 40 x 9½, built in 1865; hot blast; open top; ore, Iron Ridge; product, mill pig iron; annual capacity, 6,000 net tons. *See Illinois Furnaces. See Bay View Furnaces. See Illinois and Wisconsin Rolling Mills.*

Mayville Furnace, North Western Iron Company, Mayville, Dodge county. Office, 406 Milwaukee st., Milwaukee. One stack, 50 x 10, built in 1848; rebuilt in 1872, and again in 1884; ore, Iron Ridge, a red hematite containing 50 per cent. of metallic iron, from the company's mines located near the furnace; product, foundry and mill pig iron; annual capacity, 8,500 net tons. Brand, "Irving." Irving M. Bean, President and Superintendent; Charles F. Ilsley, Vice-President; A. C. May, Secretary and Treasurer.

Sauk Furnace, Iron Mountain Ore and Furnace Company, Ironton, Sauk county. One stack, 27 x 7½, built in 1857; warm blast; open top; steam and water power; ore, native brown hematite; specialty, foundry and car-wheel pig iron; annual capacity, 3,500 net tons. Brand, "Sauk." George B. Burrows, President; R. F. Hersey, Vice-President; Edward L. Hersey, Secretary and Treasurer; S. Brownell, General Manager. Selling agents, Pickands, Brown & Co., Chicago.

Number of charcoal furnaces in Wisconsin: 11 stacks.

HALF ANTHRACITE COAL AND HALF COKE.

Bay View Furnaces, North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 37 Mitchell Block, Milwaukee. Works at Bay View, Milwaukee county, near Milwaukee. Two stacks, (Nos. 3 and 4,) each 66 x 17, built in 1870 and 1871; ores, ⅔ Lake Superior and ⅙ Iron Ridge; product, Bessemer and mill pig iron; total annual capacity, 55,000 net tons. Formerly belonged to Milwaukee Iron Company. *See Illinois Furnaces. See Iron Mountain Furnace. See Rolling Mills of Illinois and Wisconsin.*

Minerva Furnace, Minerva Iron Company, 82 Michigan st., Milwaukee. One stack, 55 x 15, built and put in blast in the summer of 1873; hot-

blast; closed top; fuel, anthracite coal and Connellsville coke; ore, Lake Superior; product, Bessemer and foundry pig iron; annual capacity, 22,000 net tons. Brand, "Minerva." S. A. Harrison, President; S. M. Green, Secretary; R. W. Pierce, Treasurer.

Number of anthracite coal and coke furnaces in Wisconsin: 3 stacks.

Total number of furnaces in Wisconsin: 14 stacks.

MINNESOTA.

CHARCOAL.

Duluth Furnace, Duluth Iron Company, Duluth, St. Louis county. One stack, 45 x 10, built in 1872-3, and first put in blast July 12, 1880; hot blast; bell-and-hopper top; fuel, charcoal; ores, specular and hematite, from the Vermillion Range, Minn.; product is principally used for car-wheels and foundry and machine gearing; estimated annual capacity, 10,000 net tons. Brand, "Duluth." A. H. Wilder, President, St. Paul; C. H. Graves, Vice-President, Duluth; F. Sprague, Secretary and Treasurer, Stillwater; James Seville, General Manager, Duluth. Selling agents, Masters & Co., Cleveland.

Number of furnaces in Minnesota: 1 charcoal stack.

UTAH TERRITORY.

CHARCOAL.

Ogden Iron Works, Colorado Coal and Iron Company, South Pueblo, Pueblo county, Col. Furnace at Ogden. One stack, 45 x 8, begun in 1875 and completed in 1882; hot blast; bell-and-hopper top; ore, hematite; annual capacity, 4,000 net tons. The furnace is at present out of blast. *See Furnaces and Rolling Mills in Colorado.*

Number of charcoal furnaces in Utah: 1 stack.

COKE.

Iron Manufacturing Company of Utah, Iron City, Iron county. One stack, built in 1873, torn down in 1883, and foundations laid for a coke furnace, 45 x 15, to use local hematite and magnetic ores. George Q. Cannon, President; Thomas Taylor, Vice-President and Manager; John C. Cutler, Secretary; George J. Taylor, Treasurer.

Number of coke furnaces in Utah: 1 stack building. Total number of furnaces in Utah: 1 completed stack, and 1 stack building.

PROJECTED.

Norway Blast Furnace, Norway Iron Mining and Manufacturing Company, Salt Lake City. John T. Lynch, President; John R. McBride, Vice-President; John Erikson, Treasurer; B. A. M. Froiseth, Secretary and Manager.

COLORADO.

COKE.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. New York office, 41 and 43 Wall st. One completed stack, 65 x 15, built in

1880-81, and blown in September 7, 1881; three Siemens-Cowper-Cochrane fire-brick stoves; closed top; fuel, coke, produced at the company's coke ovens at El Moro; ores, native magnetic and hematite; annual capacity, 24,000 net tons. Another stack of the same size is in course of erection. *See Utah Furnaces. See Rolling Mills.*

Gunnison Coal and Steel Company, Gunnison, Gunnison county. Foundations laid for one furnace, and stone on the ground for another stack. D. J. McCanne, Superintendent.

Number of furnaces in Colorado: 1 completed coke stack, and 3 stacks building or projected.

CALIFORNIA.

CHARCOAL.

California Iron and Steel Company, Hotaling, Placer county. Office, 329 Market st., San Francisco. One stack, 45 x 10, built in 1879-80, and first blown in April 24, 1881; burned in September, 1882, and rebuilt in 1883; hot blast; closed top; fuel, charcoal; ore, magnetic, mined at the furnace; product, foundry and car-wheel pig iron, very strong; annual capacity, 12,000 net tons. Egbert Judson, President; George W. Gibbs, Vice-President; C. B. Morgan, Secretary and Treasurer; U. Seeley, Jr., Superintendent. *See Bloomaries.*

Number of furnaces in California: 1 charcoal stack.

PROJECTED.

Furnace projected at Colton, San Bernardino county.

OREGON.

CHARCOAL.

Oswego Furnace, Oregon Iron and Steel Company, Oswego, Clackamas county. One stone stack, 42 x 10, built in 1866; stack raised in 1879; open top; iron hot-blast; water-power; fuel, charcoal, made exclusively from fir; ore, 40 per cent. brown hematite, worked raw; annual capacity, 8,000 net tons. Brand, "Oregon." Foundations laid and all the material on hand for another stack, 60 x 13; iron shell; three Whitwell hot-blast stoves; work abandoned for the present. S. G. Reed, President, Portland, Oregon; Wm. M. Ladd, Vice-President; E. W. Crichton, Secretary and Superintendent, Oswego.

Number of furnaces in Oregon: 1 completed charcoal stack, and 1 stack building.

WASHINGTON TERRITORY.

CHARCOAL.

Irondale Furnace, Puget Sound Iron Company, Irondale, Jefferson county. Main office, 328 Montgomery st., San Francisco, Cal. One stack, 52 x 11, built in 1880-1, and blown in January 27, 1881; rebuilt in 1882-3, and remodeled in 1884; hot blast; open top; fuel, charcoal; ores, bog and magnetic, mined in Jefferson county, and also on Texada

Island, British Columbia; product, No. 1 foundry pig iron; annual capacity, 10,000 net tons. John A. Paxton, President; John H. Redington, Vice-President; Charles H. Simpkins, Treasurer; A. Halsey, Secretary; J. L. Smith, Superintendent.

Number of furnaces in Washington Territory: 1 charcoal stack.

PROJECTED.

Tacoma Steel and Iron Company, Tacoma, Pierce county; an English company, which proposes to erect a blast furnace.

UNITED STATES.

Total number of furnaces in the United States on September 1, 1884: 675 completed stacks, 16 stacks building, and 3 stacks partly built on which work has been suspended. There are 232 completed charcoal furnaces, 221 anthracite furnaces, 221 furnaces using coke chiefly, and 1 blast furnace using gas. Of the 16 furnaces under construction 10 are coke, 2 are anthracite, and 4 are charcoal. Of the 3 unfinished furnaces, 2 are anthracite and 1 is charcoal.

RECENTLY ABANDONED FURNACES.

NOTE.—Some of the furnaces named in this list have been standing for many years with good machinery, and at some time may again be put in operation.

NEW HAMPSHIRE.

New Hampshire Iron Company, Franconia, Grafton county. Fuel, charcoal. Abandoned in 1865.

VERMONT.

Shaftsbury Iron Works, South Shaftsbury, Bennington county. Built in 1863. Fuel, charcoal. Last blast ended in March, 1876.

MASSACHUSETTS.

Lenox Iron Works, Lenox Furnace, Berkshire county. Fuel, charcoal. One stack, 32 x 9, built in 1765, and rebuilt in 1837. Torn down in 1880.

CONNECTICUT.

Shepaug Iron Company, Roxbury, Litchfield county. Fuel, charcoal. One stack, built in 1866; has made no iron since 1872.

NEW YORK.

CHARCOAL.

Cooper's Falls Furnace, Union Iron Company of Buffalo, De Kalb, St. Lawrence county. Built in 1864; abandoned in 1868.

Dutchess County Iron Works, N. S. Simpkins, Jr., 32 Pine st., New York. Furnace at Dover, Dutchess county. One stack, built in 1834; abandoned in 1870.

Fletcherville Furnace, Witherbees & Fletcher, Mineville, Essex county. Built in 1863-4; abandoned in 1875.

Greenwood Furnace, Parrott Iron Company, Greenwood Iron Works, Orange county. One stack, 42 x 9, built in 1813; warm blast; water-power; not in blast since September, 1871.

Myers Steel and Iron Company, Clifton, St. Lawrence county. One stack, abandoned in 1870.

Napanoch Furnace, Napanoch, Ulster county. One stack, 46 x 12, built prior to 1854; torn down in 1883.

Norwich Furnace, Norwich, Chenango county. Built in 1856 and repaired in 1873; abandoned in 1880.

Rossie Iron Works, Ogdensburg, St. Lawrence county. One stack, built in 1843; not in blast since 1868.

NEW JERSEY.

Stephens Furnace, Rustic, Morris county. Built in 1877; fuel, anthracite.

Wawayanda Furnace, Wawayanda, Sussex county. Built in 1845; fuel, charcoal. Thomas Iron Company, owner, Hokendauqua, Pa.

PENNSYLVANIA.

ANTHRACITE.

Chestnut Hill Iron Ore Company, Columbia, Lancaster county. Abandoned one stack in 1881.

Dauphin Furnace, Dauphin, Dauphin county. One stack, 40 x 11, built in 1854, and remodeled in 1872 for anthracite; destroyed by fire in 1883, and not rebuilt.

Harrisburg Furnace, Harrisburg, Dauphin county. Formerly called Porter Furnace. Built in 1844 and torn down in 1881.

Montour Iron and Steel Company, Danville, Montour county. Abandoned one stack in 1880. Torn down.

Robesonia Furnace, Berks county. Built in 1845; abandoned in 1880.

Safe Harbor Furnace, Safe Harbor, Lancaster county. One stack, 45 x 14, built in 1848; abandoned in 1865. Owned by the Phoenix Iron Company, Phoenixville, Pa.

- Shamokin Furnace, David Longenecker, Shamokin, Northumberland county. Built in 1841; abandoned in 1869.
- St. Clair Furnace, St. Clair, Schuylkill county. Built in 1845; abandoned in 1880.
- William Penn Furnaces, D. O. Hitner, William Penn P. O., Montgomery county. Two stacks, 35 x 12 and 50 x 14, built in 1844 and 1845, respectively; open tops; purchased by the Pennsylvania Schuylkill Valley Railroad Company in 1883, and torn down.
- Wister Furnace, J. & J. Wister, Harrisburg, Dauphin county. One stack, 60 x 14, built in 1867, and first blown in February 15, 1868; purchased by the Philadelphia and Reading Railroad Company in 1883, and will be torn down.

BITUMINOUS COAL AND COKE.

- Brady's Bend Iron Company, F. W. Rhoades, Agent, Brady's Bend, Armstrong county. Four stacks, 44 x 9, 44 x 10½, 50 x 14, and 50 x 13½, built from 1842 to 1845; abandoned and dismantled in 1878-9.
- Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871-2; torn down in 1872, and not rebuilt.
- Lawrence Furnace, Foltz & Jordan, New Castle, Lawrence county. Built in 1846; fuel, coke and charcoal; open top; abandoned in 1873.
- Little Pet Furnace, New Castle, Lawrence county. One stack, 40 x 9, built in 1853; has not been in blast for a number of years.
- Middlesex Furnace, West Middlesex, Mercer county. Built about 1855; abandoned and sold as scrap in 1875.
- Monticello Furnace, William Acheson, Monticello, Armstrong county. Built in 1859; abandoned in 1876.
- Pine Creek Furnace, Brown & Mosgrove, Kittanning, Armstrong county. Built in 1846; abandoned and dismantled in 1879.
- Sligo Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1845; abandoned in 1873.
- Sophia Furnace, New Castle, Lawrence county. One stack, 65 x 16, built in 1872; rebuilt in 1874, but has not been in blast since.

CHARCOAL.

- Augusta Furnace, Harrisburg and Potomac Railroad Company, Daniel V. Ahl, President, Newville, Cumberland county. Furnace near Shipensburg.
- Big Pond Furnace, Newville, Cumberland county. Built in 1836; burnt in 1880.
- Caledonia Furnace, estate of Thaddeus Stevens, Graeffenburgh, Adams county. Built in 1837. Furnace in Franklin county.
- Forest Iron Works, White Deer Mills, Union county. Built in 1846. Owned by A. Pardee, Hazleton, Pa.
- Franklin Furnace, Hunter & Springer, Edenville, Franklin county. One stack, 32 x 7½, built in 1828; abandoned on account of distance from railroad.

- Howard Furnace, Howard, Centre county. One stack, 33 x 8, built in 1830; torn down in 1883.
- Huntingdon Furnace, G. & J. H. Shoenberger, Spruce Creek, Huntingdon county. Built in 1796; abandoned in 1870.
- Laura Furnace, Perry Kreamer, Assignee of W. A. Taylor & Co., Millers-town, Perry county. Built in 1873; cold blast.
- Madison Furnace, Wetter & Lyon, Sligo, Clarion county. Built in 1836; abandoned in 1874.
- Manada Furnace, Grubbs & Bland, Swatara Station, Dauphin county. Built in 1836; abandoned in 1874.
- Mary Ann Furnace, Horatio Trexler, Long Swamp, Berks county. Built in 1793; out of blast since 1869.
- Mill Creek Furnace, E. A. Green & Co., Mill Creek, Huntingdon county. Built in 1838; out of blast since 1869.
- Montebello Furnace, Fisher & Morgan, Duncannon, Perry county. One stack, 42 x 12; water-power.
- Mount Penn Furnace, Wm. M. Kaufman & Co., Reading, Berks county. One stack, 30 x 8½, built in 1830; abandoned in 1883.
- Rockhill Furnace, Rockhill Iron and Coal Company, Orbisonia, Huntingdon county. Built in 1830; abandoned in 1873.
- Rockland Furnace, Berks county. Built in 1791, rebuilt in 1879, and burned in 1881. Formerly called Sally Ann Furnace.
- Sarah Furnace, Sarah, Blair county. Built in 1824; not in blast since 1874.
- Spring Hill Furnace, Fairchance Furnace Company, Smithfield, Fayette county. One stack, 35 x 8, built in 1805, and rebuilt several times; dismantled in 1883.
- Washington Iron Works, Lamar, Clinton county. Tatlow Jackson, Agent, 520 Walnut st., Philadelphia. One stack, 30 x 7, built in 1809; has not been in blast for many years.
- York Furnace, York county. Built in 1830; made its last blast in 1874.

MARYLAND.

BITUMINOUS COAL.

- Bowery Furnace, Cumberland Coal and Iron Company, Frostburg, Alleghany county. One stack, 57 x 16, built in 1868, and rebuilt in 1873; dismantled in 1883.
- Elk Ridge Furnace, Elk Ridge Landing, Howard county. Rebuilt in 1855; not in blast since 1874.
- Knoxville Furnace, Knoxville, Frederick county. Built in 1837; not in blast since 1874. Formerly called Longacoming Furnace.

CHARCOAL.

- Chesapeake Furnace, D. M. Reese & Sons, Canton, Baltimore. One stack, 32 x 8, built in 1853; dismantled in 1883.
- La Grange Furnace, estate of E. S. Rogers, The Rocks P. O., Harford county. One stack, 32 x 7½, built in 1836; abandoned.

VIRGINIA.**COKE.**

Augusta Furnace, Augusta Iron Company, Ferrol P. O., Augusta county.
One stack, 45 x 11, built in 1864; rebuilt in 1878; closed top.

CHARCOAL.

Laurel Furnace, Lee county. Rebuilt in 1873, but only made a short blast.

Oxford Iron Works, Mount Athos, Campbell county. One stack, built prior to 1837; not in operation for many years.

Victoria Furnace, Tolersville, Louisa county. Built in 1835; out of blast since 1873.

NORTH CAROLINA.**CHARCOAL.**

Long Creek Furnace, Admiral Wilkes, High Shoals, Gaston county.
One stack; daily capacity, 4 tons.

Maratoc Iron Works, Danbury, Stokes county. Owned by parties in Richmond, Va. Though ore is plenty, this furnace has not been in blast for many years.

Stonewall Furnace, Iron Station, Lincoln county. Built in 1863; not in blast for several years.

Vesuvius Furnace, Iron Station, Lincoln county. Built in 1780; not in blast for several years.

COKE.

Gulf Furnace, S. H. Wiley, Salisbury. Works at Ore Hill, Chatham county. One stack, begun in 1873, but not completed.

GEORGIA.**CHARCOAL.**

Pool Furnace, Cartersville, Bartow county. Built in 1855; not in blast since 1874.

Rogers Furnace, Cartersville, Bartow county. One stack, 36 x 9, built in 1873; cold blast; open top.

BITUMINOUS COAL.

Bartow Iron Works, Bartow county. Two stacks, built in 1871 and 1873; one stack torn down in 1881.

ALABAMA.**CHARCOAL.**

Hale & Murdoch, Columbus, Miss. Furnace in Sanford county, Alabama. Built in 1861; abandoned in 1870; cause, 25 miles from railroad.

McKee Furnace, Jefferson Iron Company, Irondale Furnace P. O., Jefferson county. One stack, 46 x 10½; hot blast.

KENTUCKY.**CHARCOAL.**

- Belmont Furnace, Bank of Louisville, Louisville. Furnace in Bullitt county. Built in 1844; daily capacity, 12 net tons; idle since 1870.
- Boone Furnace, Boone Furnace P. O., Carter county. Office, 61 West Third st., Cincinnati. One stack, 46 x 10, built in 1855; idle since 1871. Herman Huseman, Trustee. R. D. Davis, Grayson, Ky., Agent.
- Buena Vista Furnace, Means & Co., Ashland, Boyd county. Built in 1848; hot blast; open top; dismantled in 1876.
- Buffalo Furnace, John Armstrong, Hayes, Douglas county, Illinois. Furnace at Argillite, Greenup county. One stack, 40 x 10½, built in 1851; hot and cold blast; not in blast since 1875, and for sale.
- Kenton Furnace, Damarin & Co., Quincy, Lewis county. Furnace in Greenup county. Office at Portsmouth, Ohio. One stack, 36 x 11, built in 1856; open top; hot blast.
- Laurel Furnace, Joshua Kelley, Riverton, Greenup county. One stack, 39 x 11, built in 1849; open top; cold and hot blast.
- Mammoth Furnace, Morris, Machen & Co., Eddyville, Lyon county. Built in 1845; daily capacity, 16 net tons.
- Nelson Furnace, Bank of Louisville, Louisville. Furnace in Nelson county. Built in 1834; not in blast since 1871.
- Pennsylvania Furnace, Greenup county. Built in 1848; discontinued in 1881.
- Pioneer Furnace, Northup, Cummings & Peck, Louisa, Lawrence county. One stack, 18 x 4½, built in 1881, and first put in blast in 1882.

BITUMINOUS COAL.

- Kenton Furnace, Gaylord Iron and Pipe Company, Cincinnati, Ohio. Works at Newport. Built in 1869; abandoned in 1877 and machinery removed to the Hocking Valley, Ohio, by the Crafts Iron Company.

TENNESSEE.**CHARCOAL.**

- Brownsport Furnace, Brownsport Furnace P. O., Decatur county. One stack, 42 x 9, built in 1850; has been idle for many years.
- Cedar Grove Furnaces, Perry county. Two stacks, built prior to 1857; abandoned for several years.
- Clark Furnace, La Grange Iron Company, 42 x 9½, built in 1854, and burned and rebuilt in 1881; abandoned.
- Dougherty's Furnace, Baker's Gap, Johnson county. Built in 1878; made a short blast.
- Dover Furnace, Cumberland Iron Works, Stewart county. Built in 1828; not in blast for several years.
- Eagle Furnace, Riley Stone, Bristol, Sullivan county. Built in 1838; not in blast since 1875.

Embreeville Furnace, Jonesboro, Washington county. Built in 1846; out of blast since 1874.

Great Western Furnace, Dover, Stewart county. Built in 1854; recently sold to new parties with a slight probability that it may be repaired and started up.

Pottsdale Furnace, Greeneville, Greene county. Built in 1862; out of blast since 1874.

Rose and Crockett Iron Works, Cumberland Gap, Claiborne county. One stack, built in 1823; out of blast for several years.

Rough and Ready Iron Works, Rough and Ready Furnace P. O., Stewart county. One stack, 45 x 9, built in 1850; rebuilt in 1868; abandoned.

Speedwell Furnace, Speedwell, Claiborne county. Built in 1825; out of blast for several years.

Unaka Furnace, Unaka, Greene county. Built in 1868; out of blast since 1874.

Vernon Furnace, Montgomery county. Built in 1833; not in blast for several years.

Wayne Furnace, Wayne county. Built in 1856; out of blast since 1875.

Worley Furnace, Dickson, Dickson county. Built in 1847; made a blast on coke in 1879.

OHIO.

CHARCOAL.

Cambria Furnace, Samsonville, Jackson county. Built in 1854; out of blast since 1875.

Clinton Furnace, Wheelersburg, Scioto county. Built in 1832; out of blast since 1873.

Eagle Furnace, Eagle Iron Company, Oretton, Vinton county. One stack, 32½ x 11, built in 1852; open top; abandoned in 1883.

Gallia Furnace, Norton, Campbell & Co., Portsmouth, Scioto county. Furnace in Gallia county. One stack, 36 x 10, built in 1847; open top; abandoned in 1883.

Grant Furnace, W. D. Kelly & Sons, Ironton, Lawrence county. One stack, 43 x 11, built in 1869; dismantled in 1883.

Hope Furnace, W. D. Lee, Newark. Works at Hope Furnace P. O., Vinton county. One stack, 36 x 10½, built in 1854; open top; hot blast. Formerly called Big Sand Furnace. Not in blast since 1874.

Jackson Furnace, Union Iron Company, Portsmouth, Scioto county. Furnace in Jackson county. Built in 1839.

Keystone Furnace, Bundy Iron and Coal Company, Keystone Furnace, Jackson county. One stack, 36 x 10½, built in 1849; abandoned.

Latrobe Furnace, Bundy Iron and Coal Company, Berlin X Roads, Jackson county. One stack, 35 x 10, built in 1854; abandoned.

Logan Furnace, Logan Iron Company, Logan, Hocking county. One stack, 29 x 9, built in 1852; open top; abandoned in 1883.

Manhattan Furnace, Toledo Iron Company, Toledo. Furnace at Ironville, in Toledo. One stack, 40 x 9, built in 1866; abandoned.

Ohio Furnace, Means, Kyle & Co., Hanging Rock, Lawrence county.

Furnace in Scioto county, 36 x 11½, built in 1845; abandoned in 1881.

Union Furnace, B. C. & R. D. McManigal, Union Furnace P. O., Hocking county. One stack, 32 x 10, built in 1853; abandoned.

Vesuvius Furnace, Ironton, Lawrence county. One stack, 32 x 9, built in 1833; has been idle since 1877.

Zanesville Furnace, Ohio Iron Company, Zanesville, Muskingum county.

BITUMINOUS COAL AND COKE.

Ashland Furnace, Jonathan Warner, Mineral Ridge, Trumbull county.

Built in 1859; abandoned several years ago.

Glasgow-Port-Washington Iron and Coal Company Limited, Port Washington, Tuscarawas county. Two stacks, each 70 x 17½, built in 1873-4.

Removed to Pittsburgh, Pa., in 1882.

Globe Furnace, Jackson, Jackson county. Built in 1872; burned and abandoned.

Massillon Furnace, Massillon, Stark county. Built in 1854; abandoned in 1880.

Morgan Furnace, Irondale, Jefferson county. Built in 1870; out of blast for several years.

Newburgh Furnaces, Cleveland Rolling Mill Company, Cleveland. Two stacks: one, 60 x 16, built in 1864; the other, 60 x 16½, first put in blast in October, 1872; abandoned and torn down in 1884.

Orange Furnace, Jackson, Jackson county. Built in 1864; out of blast since 1874.

Porter Furnace, Jonathan Warner, Mineral Ridge, Trumbull county.

Built in 1860; made its last blast in 1873. Totally demolished.

Volcano Furnace, Volcano Furnace Company, Massillon, Stark county.

One stack, 44 x 14, built in 1855; closed top; out of blast for several years.

Warren Furnace, Wm. Richards & Sons, Warren, Trumbull county.

Built in 1870; burned in 1878.

Wellston Furnace No. 1, Wellston, Jackson county. Built in 1874-5; abandoned in 1881.

INDIANA.

BITUMINOUS COAL.

Lafayette Furnace, Otter Creek, Clay county. Built in 1868; torn down in 1879.

Planet Furnace, Indianapolis Rolling Mill Company, Harmony, Clay county. Built in 1867; torn down in 1877.

Western Furnaces, Knightsville, Clay county. Two stacks, built in 1867 and 1868; torn down in 1879.

ILLINOIS.

BITUMINOUS COAL OR COKE.

Grand Tower Furnaces, Grand Tower, Jackson county. Two stacks,

built in 1868 ; not in blast since March, 1876 ; both stacks torn down. Illinois Furnace, Elizabethtown, Hardin county. Rebuilt in 1873, but not put in blast.

MICHIGAN.

CHARCOAL.

Bancroft Furnace, Bancroft Iron Company, Marquette, Marquette county. Built in 1859, and rebuilt in 1871 ; water-power.

Bay Furnaces, Bay Furnace Company, Onota, Schoolcraft county. Two stacks : one, 45 x 9, built in 1870 ; the other, 45 x 9½, built in 1872 ; burned in 1877. E. P. Williams, Secretary, Marquette.

Carp River Furnace, Marquette, Marquette county. One stack, 45 x 10, built in 1872-3 ; burned November 17, 1882, and not rebuilt.

Cliffs Furnace, Negaunee, Marquette county. Built in 1867 ; out of blast for several years, and abandoned.

Collins Furnace, Collins Iron Company, Marquette, Marquette county. Built in 1858 ; abandoned in 1873.

Escanaba Furnace, Escanaba, Delta county. Built in 1872-3 ; torn down in 1879 and machinery removed to the Edgar Thomson Steel Works, Pa.

Harvey Furnace, Northern Iron Company, Harvey, Marquette county. Built in 1860, and rebuilt in 1873.

Michigan Iron Company, Marquette. Furnaces at Clarksburgh, Marquette county. Two stacks : Greenwood, 42 x 9, built in 1865 ; and Michigan, 42 x 9, built in 1867.

Morgan Iron Company, Marquette. Furnaces at Morgan, Marquette county. Two stacks : Morgan, 45 x 9, built in 1863 ; Champion, 45 x 9, built in 1867, and burned in 1874.

Munising Furnace, Munising, Schoolcraft county. Built in 1867 ; out of blast for several years.

WISCONSIN.

CHARCOAL.

National Furnace, Depere, Brown county. One stack, 48 x 12, built in 1872 ; abandoned.

Richland Furnace, Cazenovia, Richland county. Built in 1876, and torn down in 1879.

MISSOURI.

CHARCOAL.

Iron Mountain Furnaces, St. Francois county. Two stacks, built in 1846 and 1854 ; not in blast for several years.

Osage Furnace, J. A. Quealy, Osage Iron Works, Camden county. Built in 1873, and in blast a very short time.

Scotia Iron Furnace, Leesburg, Crawford county. Built in 1870 ; abandoned in 1879.

ROLLING MILLS AND STEEL WORKS.

MAINE.

Pembroke Iron Works, James C. Warr, lessee, Pembroke, Washington county. Office, Wareham, Plymouth county, Mass. Built prior to 1854; 9 double puddling furnaces, 1 single and 3 double heating furnaces, 30 nail machines, and 4 trains of rolls (one 8, one 14, and two 16-inch); steam and water power; product, bars, bands, nails, and skelp iron; annual capacity, 10,000 net tons. *See Franconia Iron and Steel Works, Mass.*

Portland Rolling Mill, Portland, Cumberland county. P. O. Box 1,386. Built in 1866; 4 double puddling furnaces, 4 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron, railroad spikes, and fish-plates; annual capacity, 12,000 net tons. C. R. Milliken, President; John W. Leavitt, Secretary and Treasurer; Samuel Peters, Superintendent.

Number of rolling mills in Maine: 2.

NEW HAMPSHIRE.

Nashua Iron and Steel Company, Nashua, Hillsborough county. Aretas Blood, Treasurer, Manchester, N. H. Built in 1848; steel-tire mill added in 1867; 20 heating furnaces, one 10-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, and 11 hammers; machine shop built in 1863, and rebuilt and enlarged in 1872, for manufacturing rolling-mill and steam machinery; product, steel and iron forgings for railroads and machine shops, homogeneous steel and iron plates, steel plates, and steel locomotive and car tires, bar steel, bar iron, and hardened-steel-tired car, truck, and tender wheels. Brand, an Indian head. John D. Swain, Superintendent, Nashua.

Number of rolling mills and open-hearth steel works in New Hampshire: 1.

VERMONT.

St. Albans Iron and Steel Works, St. Albans, Franklin county. Put in operation May 10, 1873; 5 double and 5 single puddling furnaces, 8 heating furnaces, 2 hammers, and 2 trains of rolls (one 19 and one 21-inch); one 10-gross-ton Siemens open-hearth steel furnace added in 1877. E. A. Smith, the Vice-President, Secretary, and Treasurer, says that the works will probably be dismantled and the buildings used for other manufacturing purposes.

Number of open-hearth steel works in Vermont: 1.

MASSACHUSETTS.

Bay State Iron Works, Bay State Iron Company, 2 Pemberton Square, Boston, Suffolk county. Puddle mill built in 1847; 16 double puddling furnaces and 2 trains of rolls. Plate mill No. 1 built in 1863; 2 trains of rolls and 5 heating furnaces; product, tank plate and boiler tube and pipe strips; annual capacity, 6,500 net tons. Plate mill No. 2 built in 1873; 2 trains of rolls, 6 heating furnaces, and 1 annealing furnace; product, steel plates, flange, boiler, and tank iron; annual capacity, 8,500 net tons. One 6-gross-ton Siemens open-hearth steel furnace; annual capacity, 2,800 net tons of ingots. Sheet mill built in 1879; 2 trains of rolls, 2 single and 1 double puddling furnace, 4 knobbling fires, 2 heating furnaces, 2 pair furnaces, 2 sheet furnaces, and 2 annealing furnaces; product, fine sheet iron; annual capacity, 4,500 net tons. Brand of iron and steel plates and sheet iron made, "Bay State." J. Avery Richards, Treasurer and General Manager. The other officers are as follows: Charles O. Whitmore, President; F. Gordon Dexter, Silas H. Witherbee, Thornton K. Lothrop, and Edward W. Hooper, Directors. *See New York Furnaces.*

Bridgewater Iron Company, Bridgewater, Plymouth county. Built in 1785 and 1874; 5 scrap furnaces, 3 heating furnaces, 6 forge fires, 8 trains of rolls, and 10 hammers; use scrap iron and scrap steel exclusively; product, bar iron and tack plate, sheet zinc and sheet copper, and iron and steel forgings; product of rolled iron, about 6,000 net tons yearly. Nahum Stetson, Treasurer. *See Parker Mills.*

Cambridge Rolling Mills, Gilmore & Eustis, lessees, Cambridgeport, Middlesex county. Built in 1868; 5 heating furnaces and 3 trains of rolls; product, merchant bar and shafting iron to 2½ inches in diameter, axe iron, rerolled Norway and Swedish shapes, bolt, nail, rivet and wire rods, scrap wire and rivet rods, scrap rods, scrolls, tires, and horse-shoe iron; annual capacity, 10,000 net tons. Stamp for best refined is "B. R. M." Special stamps are used on other kinds of iron. Formerly called Boston Rolling Mills. The works were burned July 19, 1884; are now being rebuilt, and will be completed in November.

Danvers Iron Works, Arthur G. Tompkins & Co., 8 Oliver st., Boston. Works at Danversport, Essex county. Built in 1831; destroyed by fire January 1, 1883; rebuilt and put in operation May 1, 1883; 3 heating furnaces and 2 trains of rolls (one 8 and one 12-inch); product, merchant bar iron, bolt iron, scrap rods, and rerolled Norway and Swedish shapes; annual capacity, 5,000 net tons. Brand, "Danvers."

East Bridgewater Iron Company, Rogers & Sheldon, 81 Water st., Boston. Works at East Bridgewater, Plymouth county. Built in 1837; 1 double puddling furnace, 6 heating furnaces, 2 charcoal fires, 1 train of rolls, 26 nail machines, and 1 hammer; steam and water power; product, cut nails, clinch nails, tack plate, shovel plate, and charcoal blooms; annual capacity, 40,000 kegs of nails and 1,500 tons of other products.

Fall River Iron Works, Fall River Iron Works Company, Fall River, Bristol county. Built in 1822, and rebuilt in 1842; 3 buildings—rolling mill, nail mill, and machine shop; 9 double and 5 single puddling furnaces, 11 heating furnaces, 105 nail machines, 2 hammers, and 9 trains of rolls (two 8, three 9, and four 18-inch); product, nails, hoops, bands, and merchant bar iron to 3 inches round, square, and flat; annual capacity, 11,000 net tons. Jefferson Borden, President; R. C. Brown, Agent and Treasurer.

Franconia Iron and Steel Works, James C. Warr, lessee, Wareham, Plymouth county. Built in 1866; 6 double puddling furnaces, 6 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, bar iron, of all kinds and sizes; specialties, round, square, and flat iron, ovals, half ovals, half rounds, axle and axe iron, and shafting; daily capacity, 30 net tons. *See Pembroke Iron Works, Maine.*

Globe Nail Company, Station "A," Boston. Built in 1877; 2 heating furnaces and 2 trains of rolls (one 12 and one 9-inch); use Swedish iron; product, horse-nail plate, tack plate, and other special rolling; annual capacity, about 5,000 net tons. Aretas Blood, President; J. T. Bailey, Treasurer; W. B. Crocker, Secretary; W. H. H. Miner, Superintendent.

Gosnold Mills, 566 Acushnet avenue, New Bedford, Bristol county. Built in 1857; 7 heating furnaces, 5 trains of rolls, (two 8, one 10, and two 18-inch,) and 10 nail machines; use best wrought scrap iron and charcoal ore blooms; product, hoops, bands, scrolls, tires, rods, chains of every description, horse-shoe and hame iron, and 3d fine nails; annual capacity, 4,500 net tons of rolled iron, 4,500 kegs of nails, and 250 net tons of chains. Brand, "Gosnold." Leading products are hoops and wire rods. George Wilson, President; John A. Bates, Secretary and Treasurer; Henry Howard, Superintendent.

Joseph W. Howard Limited, corner Albany and Swett sts., Boston. First crucible steel made in September, 1883. Four 4-pot steel melting furnaces; 16 pots can be used at each heat; product, steel castings of every description; annual capacity, 300 net tons.

Kinsley Iron and Machine Works, Kinsley Iron and Machine Company, Canton, Norfolk county. Established in 1787 by Leonard & Kinsley, who manufactured steel by the German process until about 1821, when the firm was dissolved, Adam Kinsley continuing the business until his death, when he was succeeded by his son, Lyman Kinsley. In 1855 a stock company was formed. Works were burned January 14, 1875, and were rebuilt, enlarged, and started May 24, 1875; 4 double puddling and 5 heating furnaces, 1 busheling and 2 scrap furnaces, 8 hammers, and 3 trains of rolls (one 8, one 14, and one 19-inch); steam and water power; product, merchant bar iron, shapes, splice bars, track bolts, and railroad supplies; annual capacity, single turn, 6,000 net tons. Brands of bar iron, "Kinsley" and "G. K." Forge connected with the works for the production of car and locomotive forgings, wagon axles, etc.; a foundry for the manufacture of castings;

and a machine shop for the building of new machinery and for jobbing. Fred. L. Ames, President; Edw. R. Eager, Treasurer; Frank M. Ames, Agent.

Mount Hope Iron Works, Somerset, Bristol county. Built in 1875; 1 single and 3 double puddling furnaces, 5 heating furnaces, 65 nail machines, and two 18-inch trains of rolls; product, nails, tack plate, skelp iron, shovel plate, etc.; annual capacity, 4,500 net tons. Machine shop in addition, with tools complete for building nail machines and flax and hemp dressing machinery. Job M. Leonard, Treasurer; Henry B. Leonard, Agent. *See Bloomaries.*

Norway Steel and Iron Company, 23 Mason Building, Boston. Works at 363 Dorchester avenue, South Boston. Built in 1854; 2 double and 6 single puddling furnaces, 14 heating furnaces, 10 trains of rolls, three 10-gross-ton Siemens-Martin open-hearth steel furnaces, and 3 hammers; steel products, bars, rods, boiler and other plates, machinery, spring, tire, toe-calk, and sleigh-shoe steel; also plant for the manufacture of finished compressed steel shafting; iron products, bars, rods, strips, and shapes; total annual capacity, 27,000 net tons. Brands, "Benzon," "Vasa," "Malar," "Norway," "N. I. W.," a five-point star, S with a crown over it, and N with a crown over it.

Old Colony Iron Company, Taunton, Bristol county. Works at Taunton and at Somerset. The Taunton works were built in 1825; 8 double and 1 single puddling furnace, 20 heating furnaces, 7 trains of rolls, and 5 hammers; steam and water power; product, tack plate and shovels. The nail factory was destroyed by fire in August, 1881, but will not be rebuilt. The Somerset Iron Works, at Somerset, were built in 1855; 7 double puddling furnaces, 6 heating furnaces, 70 nail machines, and two 12-inch trains of rolls; product, nails, shovel plate, nail machines, castings, mill machinery, hoisting engines, etc. Total annual capacity of rolled iron, 5,000 net tons; of nails, 110,000 kegs. O. A. Washburn, Jr., Agent and Treasurer.

Parker Mills, Bridgewater Iron Company, Bridgewater. Works at Wareham, Plymouth county. Built in 1815; 6 double puddling furnaces, 4 heating furnaces, 75 nail machines, 2 trains of rolls, and 1 hammer; water-power; product, nails. *See Bridgewater Iron Company.*

Reed Brothers' Rolling Mill, D. L. & F. S. Reed, Brockton, Plymouth county. Mill at Matfield, Plymouth county. Built in 1881-2; first put in operation in February, 1882; 4 heating furnaces, one 16-inch train, one 20-inch train, and 30 nail machines; steam and water power; product, tack plate, nail plate, and nails; annual capacity, 500 net tons of tack plate and 22,000 kegs of nails.

Robinson Iron Company, Plymouth, Plymouth county. Built about 1800; 1 double puddling furnace, 6 heating furnaces, 2 trains of rolls, 18 nail machines, and 1 squeezer; steam and water power; product, nails and tack plate; average yearly production, 3,000 net tons. Increase Robinson, President; James Millar, Treasurer.

Tisdale Nail Works, Wm. E. Coffin & Co., 8 Oliver st., Boston. Works at East Wareham, Plymouth county. Built in 1836; 5 double puddling furnaces, 7 heating furnaces, 3 trains of rolls, and 80 nail machines; water-power; product, bar iron, nails, and tack plate; annual capacity, 70,000 kegs of nails. This includes Glen Rolling Mill, belonging to the same property, situated $2\frac{1}{2}$ miles from the Tisdale Works. Idle.

Tremont Nail Works, Tremont Nail Company, West Wareham, Plymouth county. Built about 1820; rebuilt in 1846; 6 double puddling furnaces, 1 scrap furnace, 1 Siemens gas and 4 coal heating furnaces, 3 trains of rolls, (one 18-inch muck, one 18-inch nail plate, and one 16-inch tack plate,) and 75 nail machines; steam and water power; annual capacity, 100,000 kegs of cut nails, 2,000 net tons of plate iron, and 500 net tons of washers. Nails are branded "Gas Worked." Horace P. Tobey, Treasurer.

United States Navy Yard, Charlestown, Middlesex county. Mill built in 1868; 42 forge fires, 4 heating furnaces, 7 hammers, and 2 trains of rolls (one 18 and one 10-inch); product, bar iron; annual capacity, single turn, 3,000 net tons. Idle.

Wareham Nail Company, South Wareham, Plymouth county. Built in 1836; 1 double puddling furnace, 3 heating furnaces, 33 nail machines, and 2 trains of rolls; steam and water power; product, nails; annual capacity, 70,000 kegs. Edgar Robinson, owner.

Washburn and Moen Manufacturing Company, Worcester, Worcester county. Two mills: Quinsigamond Rolling Mill, built in 1846; 7 heating furnaces and 2 trains of rolls; product, iron and steel screw, rivet, and wire rods; annual capacity, 10,000 net tons. Grove Mill, built in 1868; 4 heating furnaces and 3 trains of rolls; product, patent continuous wire rods of long lengths and small size for telegraph and rope wire; annual capacity, 50,000 net tons. Philip L. Moen, President and Treasurer; Chas. F. Washburn, Vice-President and Secretary; Chas. H. Morgan, General Superintendent.

Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester; erected in 1864; twelve 4-pot steel furnaces, 3 heating furnaces, 1 train of tire rolls, and 1 hammer; 48 pots can be used in the steel works at each heat; product, crucible cast steel car-wheel tires; annual capacity, 1,100 net tons. Brand, "Washburn Car-wheel." W. A. Healy, President; Wm. H. Barnum, Vice-President and Manager; Salisbury Hyde, Secretary and Treasurer.

Weymouth Iron Company, East Weymouth, Norfolk county. Built in 1836; 6 double puddling furnaces, 5 heating furnaces, 82 nail machines, and 3 trains of rolls; steam and water power; product, iron and steel nails and spikes; annual capacity, 112,000 kegs. Isaac Pratt, Jr., President; Nahum Stetson, Treasurer and Manager.

Worcester Steel Works, Worcester, Worcester county. Built in 1857, and remodeled in 1882 to roll steel rails; 2 Siemens heating furnaces, 2 trains of rolls, and two hammers. Two 4-ton Bessemer converters

added in 1884; first blow made June 2, 1884, and first steel rail June 11, 1884; product, Bessemer steel rails; annual capacity, 40,000 net tons. The company also makes car-wheels. George M. Rice, President; M. J. P. McCafferty, Secretary; Edwin Gleason, Treasurer; Samuel D. Nye, Manager; Wm. E. Colles, General Superintendent. Number of rolling mills and steel works in Massachusetts: 26. Of these 2 are open-hearth steel works, 2 are crucible steel works, and 1 is a Bessemer steel works.

RHODE ISLAND.

Rhode Island Horse Shoe Works, Rhode Island Horse Shoe Company, Providence. Works at Valley Falls, 6 miles from Providence. Built in 1867, and rebuilt in 1874; 7 scrap and 5 heating furnaces, 8 trains of rolls, (five 8 and three 18-inch,) and 24 horse-shoe machines; product, bars for the horse-shoe machines; annual capacity, single turn, 14,500 net tons. Brand, "Perkins' United States Standard Horse and Mule Shoes." F. W. Carpenter, President; C. H. Perkins, General Manager; R. W. Comstock, Secretary.

Number of rolling mills in Rhode Island: 1.

CONNECTICUT.

Ætna Nut Company, Southington, Hartford county. Built in 1872-3; 2 single puddling furnaces, 4 scrap and busheling furnaces, 3 heating furnaces, and 3 trains of rolls; product, squares, rounds, nut shapes, bolt rods, and butt iron; annual capacity, 5,500 net tons. R. A. Neal, President; Benjamin S. Porter, Secretary; Geo. B. Finch, Treasurer.

Birmingham Rolling Mill, Peck, Stow, and Wilcox Company, Birmingham, New Haven county. Principal office at Southington. Salesroom, 27 Chambers st., New York. Built in 1843; 2 busheling furnaces, 3 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls; steam and water power; product, bar iron, nut and bolt rods, nuts, washers, lag screws, and machine and carriage bolts; annual capacity, 600 net tons. R. A. Neal, President; S. C. Wilcox, Vice-President; T. H. McKenzie, Secretary; Stephen Walkley, Treasurer; H. S. Grannis, Manager.

Cold Spring Iron Works, Mitchell Brothers, Norwich, New London county. Built in 1845; 4 heating furnaces and 2 trains of rolls (one 9 and one 20-inch); product, ovals, half ovals, half rounds, rods, and bands; annual capacity, 2,200 net tons.

Collins Company, Collinsville, Hartford county. Established in 1826; 2 single scrapping furnaces on cinder bottom, 8 heating furnaces, 1 18-inch train of rolls, one 12-inch train, 2 Sellers steam hammers, 2 20-ton steel cementing furnaces, and 30 steel-melting holes; 180 pots can be used at each turn in steel works; water and steam power; product, bar iron and cast steel, consumed wholly in these works in the production of "Collins" edge tools, steel plows, etc.; annual

capacity of finished iron, 2,500 net tons, and of steel, 750 net tons. William J. Wood, President and Treasurer; Edward H. Sears, Vice-President; Meigs H. Whaples, Secretary; Charles H. Blair, Superintendent. Treasurer's and transfer office, Hartford. General selling agents, Collins & Co., 212 Water st., New York.

Farist Steel Works, Farist Steel Company, Bridgeport, Fairfield county.

Built in 1868; 2 single puddling and 4 heating furnaces, 2 trains of rolls, (one 12 and one 15-inch,) 6 hammers, and 18 4-pot steel-melting holes; can use 72 pots at each heat in steel works; product, cast steel, rolled and hammered; annual capacity, 1,800 net tons. Added in 1883 a spring shop, containing machinery for the manufacture of spiral springs; also machinery for the manufacture of elliptic railroad springs. Joel Farist, President; John B. Windsor, Treasurer.

Greenwich Iron Works, James S. Lounsbury, owner, Mianus, Fairfield county. Built in 1835; 2 single puddling furnaces, 1 heating furnace, and 2 trains of rolls; water-power; product, round and square rods, $\frac{1}{4}$ to $\frac{5}{8}$; annual capacity, 1,500 net tons. Idle.

New Haven Rolling Mill, New Haven Rolling Mill Company, New Haven. Completed in August, 1871; 6 charcoal forge fires, 6 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 1 hammer; use only scrap iron; product, small rounds and flats and refined and charcoal wire rods; annual capacity, 5,000 net tons. H. M. Welch, President; E. S. Wheeler, Secretary; Pierce N. Welch, Treasurer.

Stillwater Iron Works, Stillwater Company, Stamford, Fairfield county.

Built in 1835; 1 single puddling furnace, 2 heating furnaces, and 3 trains of rolls; steam and water power; product, round and square rods, $\frac{1}{4}$ to $\frac{5}{8}$, and wire; annual capacity, 2,000 net tons.

Thames Iron Works, Norwich, New London county. Built in 1863; 4 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 rotary squeezer; product, common bar iron; spike rods a specialty; annual capacity, 3,000 net tons. John Mitchell, President; James Greenwood, Secretary and Treasurer.

Windsor Locks Steel Company, Bridgeport. Works at Windsor Locks, Hartford county. Built in 1860; 4 heating furnaces, 2 Lehigh heating furnaces, and 3 trains of rolls; water-power; product, rolled and hammered cast steel and rolled Siemens-Martin and Bessemer steel; annual capacity, 3,000 net tons. L. W. Eaton, President; W. Minor Smith, Treasurer; F. E. Williams, Secretary.

Number of rolling mills and steel works in Connecticut: 10, of which 2 are crucible steel works.

NEW YORK.

Albany and Rensselaer Iron and Steel Company, Troy, Rensselaer county. Comprises two establishments, consolidated in 1875: Albany Iron Works, established in 1819; 7 double and 14 single puddling furnaces, 18 heating furnaces, 7 trains of rolls, 3 steam and 4 trip-hammers, 45 nail machines, 2 bolt, 6 rivet, 2 nut, and 6 spike

- machines; steam and water power; product, bars, angles, car-axles, bands, finger-bars, crow-bars, railroad and boat spikes, fish-plates, bolts and nuts, cut nails, and boiler rivets; annual capacity, 37,000 net tons. Brands of iron, "A. I. W.," "Corning's Best Best," and "Troy." Rensselaer Iron Works, established in 1846; three-high iron and steel rail mill and merchant mill built in 1866 and 1867; new merchant mill built in 1877 and 1878; 26 heating furnaces, 5 trains of rolls, and 3 steam hammers; product, rails, bar iron, steel shapes and sheets, and special and agricultural steels; annual capacity of rail mill, 135,000 net tons; capacity of merchant mill, 25,000 tons. Brands of steel, "XX Gun," "XX Special Dead Soft," and "XX Gun Barrel," besides an infinite variety of other special grades. Bessemer steel works built in 1864; made their first blow on February 15, 1865; 2 converters, each of 7 gross tons capacity; 4 cupolas and 2 spiegel furnaces; annual capacity, 180,000 net tons ingots; blooming department contains 4 heating furnaces and an adjustable train of 31½-inch rolls; capacity to roll full product of converting department; foundry with 2 cupolas; steam-power, with auxiliary water-wheel. Erastus Corning, President; Chester Griswold, Vice-President, 56 Broadway, New York; Selden E. Marvin, Secretary and Treasurer; Robert W. Hunt, General Superintendent. *See Furnaces.*
- Anchor Brand Axle Works, Sheldon & Co., Auburn, Cayuga county. Built in 1874; 2 heating furnaces, one 16-inch train of rolls, and 1 hammer; water and steam power; use scrap iron only; product, bar iron, all used in the manufacture of axles; annual capacity, 6,000 net tons.
- Auburn Iron Works, C. W. Tuttle & Co., Auburn, Cayuga county. Built in 1853; 1 heating furnace, one 9-inch train of rolls, and 1 Kinsley steam hammer; use scrap iron only; product, merchant bar, of all sizes and shapes, and horse-shoe iron; annual capacity, 2,000 net tons. Brand, "Auburn."
- Auburn Rolling Mill, E. D. Clapp Manufacturing Company, Auburn, Cayuga county. Built in 1880; 1 heating furnace and 2 trains of rolls (one 9 and one 16-inch); use scrap iron and muck bar, and reroll Norway iron; product, merchant bar of all sizes and shapes, all used by the company in the manufacture of carriage hardware and farm wagons and other vehicles; annual capacity, 2,200 net tons. E. D. Clapp, President and Treasurer; J. G. Knapp, Vice-President; D. E. Clapp, Secretary; F. Van Patten, Superintendent.
- Ausable Horse Nail Works, Ausable Horse Nail Company, Keeseville, Clinton county. Built in 1869; 2 heating furnaces, 1 train of rolls, and 1 hammer; water-power; product, nail rods only, all worked into horse nails by this company; annual capacity, 2,000 net tons. Abraham Bussing, President; Daniel Dodge, Vice-President; J. R. Romeyn and Abraham Bussing, Secretaries; Edmund K. Baber, Treasurer and Manager. Sole Agent, Abraham Bussing, 4 Warren st., New York.
- Burden Iron Works, Burden Iron Company, Troy, Rensselaer county.

Founded in 1813 ; 33 double and 30 single puddling furnaces, 13 heating furnaces, and 13 trains of rolls ; steam and water power ; product, bar and other merchant iron, horse shoes, and boiler rivets ; specialties, Burden's horse shoes and boiler rivets ; annual capacity, 50,000 net tons. Brands of merchant iron, "H. B. & S." and "Burden Best." James A. Burden, President ; I. Townsend Burden, Vice-President ; John L. Arts, General Manager. *See Furnaces.*

Chrome Steel Works, corner Kent avenue and Keep st., Brooklyn, E. D., Kings county. Built in 1869 ; 7 heating furnaces, 7 hammers, 24 steel-melting holes, and 2 trains of rolls (one 9 and one 18-inch) ; 96 pots can be used at each heat in steel works ; product, tool steel and burglar-proof welded steel and iron for safes, jails, etc. ; annual capacity, 2,000 net tons. S. H. Kohn, Proprietor ; C. P. Haughian, Superintendent.

Cohoes Rolling Mill, Morrison, Colwell & Page, 253 River st., Troy. Works at Cohoes, Albany county. Built in 1864 ; burned in 1883 ; rebuilt and covered and sided with new grooved sheet iron ; 12 double puddling furnaces, 3 scrap and 4 heating furnaces, and 4 trains of rolls ; water-power ; product, band iron, bar iron, and patent punched axepolls ; specialty, high-grade iron for edge tools and butts and hinges ; annual capacity, 9,000 net tons.

Elmira Rolling Mills, Elmira Iron and Steel Rolling Mill Company, Elmira, Chemung county. Mill built originally as a rail mill in 1860 ; puddle mill built in 1874 ; enlarged in 1877 ; rail mill converted into puddle mill in 1883 ; 24 single and 2 double puddling furnaces, 1 hammer, 2 rotary squeezers, and 2 18-inch trains of rolls. Bar mill erected in 1864 ; 4 heating furnaces, 3 trains of rolls (one 9, one 12, and one 18-inch). Universal mill has lately been put in operation to roll plates from 6 to 30 inches wide and of any thickness ; operated by two reversing engines, with cylinders 22 inches in diameter and 48-inch stroke ; 2 Siemens heating furnaces, 9 x 12 feet, with a daily capacity of 20 tons. Annual capacity of the works, 20,000 net tons of bar, angle, plate, and band iron. H. W. Rathbone, President and General Superintendent ; J. B. Rathbone, Vice-President ; Jesse L. Cooley, Secretary and Treasurer ; H. D. V. Pratt, Agent ; Wm. Clark, Manager. *See Furnaces.*

Hudson River Rolling Mill, United Iron Company, lessee, Poughkeepsie. Built in 1873 ; 6 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls ; specialty, horse shoes ; annual capacity, 8,000 net tons. Owned by the Hudson River Iron Company.

Johnson (Isaac G.) & Co., Spuyten Duyvil, New York City. Crucible steel plant erected in 1880 ; first crucible steel made in 1880 ; four 5-pot steel melting holes ; 20 pots can be used at each heat in steel works ; annual capacity, 200 net tons of miscellaneous crucible steel castings. Open-hearth steel plant erected in 1882 ; first open-hearth steel made in 1882 ; one 8-gross-ton open-hearth steel furnace ; annual capacity, 2,000 net tons of miscellaneous open-hearth steel castings.

- Manhattan Rolling Mill, John Leonard, 445 West st., New York. Built in 1881; 2 heating furnaces and 2 trains of rolls (one 8 and one 18-inch); product, horse-shoe iron and small flats; annual capacity, 2,000 net tons of horse-shoe iron and 600 net tons of flats. Brand, "J. L. H. S. Iron." E. B. Edwards, Manager.
- Monhagen Steel Works, Wheeler, Madden, and Clemson Manufacturing Company, Middletown, Orange county. Built in 1862-3; 48 2-pot steel-melting holes, 4 heating furnaces, 1 train of rolls, and 1 hammer; 96 pots can be used at each heat in steel works; product, saw cast steel; annual capacity, 2,500 net tons. Edward M. Madden, President; Wm. Clemson, Vice-President; Wm. Millsbaugh, Secretary; Charles I. Humphrey, Treasurer.
- Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse, Onondaga county. Built in 1864; 10 heating furnaces, 3 hammers, 5 trains of rolls, (two 9, one 10, and two 12-inch,) and 5 steel-cementing furnaces; manipulators of old Bessemer steel rails and locomotive tires, and converters of iron into blister steel; product, bar steel, steel crow-bars, seat springs, tire and spring steel, and steel for various other purposes; annual capacity, 6,000 net tons. Special brands, "Sweet's Excelsior" tire steel, "Sweet's" seat springs, and "Sweet's" steel crow-bars. Wm. A. Sweet, President and Manager; Henry Babcock, Secretary. Agents: B. R. Houghton, Boston; Parkhurst & Wilkinson, Chicago; H. D. Morris, San Francisco; R. M. Brinton, Philadelphia.
- Osborne (D. M.) & Co., Auburn, Cayuga county. Built in 1881; 3 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and 1 Morgan and Williams steam hammer; use scrap iron only; product, merchant bar of all sizes and shapes, used by the firm in the manufacture of agricultural machinery; annual capacity, 4,500 net tons. D. M. Osborne, President; J. H. Osborne, Secretary; G. W. Allen, Treasurer.
- Rome Iron Works, Rome Iron Works Company, Rome, Oneida county. Built in 1866 to make rails; changed in 1882 to a merchant mill; 5 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 20, one 12, and one 8-inch); product, skelp and angle iron, girders, and large bars; annual capacity, 10,000 net tons. Dr. S. O. Scudder, President; J. S. Haselton, Treasurer.
- Rome Merchant-Iron Mill, Rome, Oneida county. Built in 1869; 4 double and 4 single puddling furnaces, 4 heating furnaces, 1 squeezer, and 3 trains of rolls (one 8, one 12, and one 18-inch); product, best grades of merchant bar iron, horse-shoe, scroll, hoop, and band iron, and a superior quality of iron from charcoal pig branded "J. G.;" annual capacity, 8,000 net tons. G. V. Selden, President; B. J. Beach, Vice-President; J. B. Jervis, Secretary; A. R. Rand, Treasurer; John Groves, Superintendent; Jay Hildreth, Agent.
- Sable Iron Works, J. & J. Rogers Iron Company, Ausable Forks, Essex county. Built in 1834; operated in connection with a forge; 2 heating furnaces, 2 trains of rolls, (one 8 and one 12-inch,) and 10 nail

machines; water-power; product, bars for conversion into cast steel, Peru horse-shoe iron, round and square iron, and Sable cut nails; annual capacity, 7,000 net tons. Brands, "Peru iron," "Rogers," or R in a circle. H. D. Graves, President; H. W. Stetson, Vice-President; Benjamin E. Wells, Secretary. *See Forges.*

Sanderson Brothers Steel Company, Syracuse, Onondaga county. New York office, 11 Gold st. Established in 1876; 5 heating furnaces, 8 hammers, 2 forge fires, 3 trains of rolls, (9, 10, and 12-inch,) 2 steel-cementing furnaces, and 1 16-pot and 4 12-pot Siemens melting furnaces; 64 pots can be used at each heat in steel works; use clay pots made by the company; product, bar cast steel; annual capacity, 2,000 net tons. Brand, "Sanderson Bros. & Co." Makers of the genuine Sanderson best cast steel. Lucius Gleason, President; Wm. W. Teall, Secretary and Treasurer; C. H. Halcomb, General Manager.

Spuytten Duyvil Rolling Mill, Welch & Barnum, Spuytten Duyvil, New York City. Rail mill built in 1863; 4 double puddling and 10 heating furnaces and 2 trains of 3-high 18-inch rolls. Bar and guide mill added in 1872; 4 heating furnaces and 2 trains of rolls (one 9 and one 16-inch). Product, rails, fish-plates with bolts and nuts complete, railroad and dock spikes, rivets, and all sizes of merchant and guide mill iron; annual capacity, 20,000 net tons. Started up in September, 1879, after several years' idleness. J. F. Lewis, Superintendent.

Star Iron Works, Bowen & Signor, Saranac, Clinton county. Built in 1878; 2 trains of rolls, operated in connection with a forge; product, nail rods, bolt and rivet rods, bars for crucible steel, etc. *See Forges.*

Syracuse Iron Works, Syracuse, Onondaga county. Built in 1861; burned August 27, 1882; rebuilt, and resumed operations January 1, 1883; 5 double and 2 double-double puddling furnaces, 6 heating furnaces, 3 trains of rolls, (one 8, one 9, and one 19-inch,) and 2 steam hammers; product, best grades of merchant bar, wire-rod, band, and hoop iron, railroad and boat spikes, fish bolts, and horse-shoe and bridge iron; also, horse shoes, (Farmer's patent,) cotton ties, (Wright's patent,) and steel tire and wire rods; annual capacity, 10,000 net tons. Brand, "S. I. W." A superior quality of iron from charcoal pig is branded "E. B. B." R. N. Gere, President; Charles E. Hubbell, Secretary and Treasurer; Mark Reeves, Superintendent.

Ulster Iron Works, Tuckerman, Mulligan & Co., Saugerties, Ulster county. Built in 1827; 1 single and 8 double puddling furnaces, 4 heating furnaces, 6 trains of rolls, and 1 hammer; water-power; product, bar, rod, and hoop iron; annual capacity, 6,700 net tons. Product called "Ulster" iron.

Union Iron Works, Union Iron Company of Buffalo, Buffalo, Erie county. Built in 1862, and enlarged in 1864, 1865, and 1874; 16 double puddling and 18 heating furnaces, and 6 trains of rolls, (one 8, one 12, one 19, two 21, and one 31-inch,) all 3-high; the 8 and 12-inch are for merchant bar, the 19-inch for puddle bar, one 21-inch for beams, channels, large angles, and flats, and the others are for rails. The plate

mill, 90 feet by 160 feet, contains one set 2-high roughing rolls, 31 in. x 96 in., and one set 3-high finishing rolls, 31 in. x 96 in.; weight of each roll, 24,000 lbs.; total weight of train, 170 tons; engine, 36-in. cylinder, 7½-foot stroke; weight of fly-wheel, 54 tons. Product, rails, beams, channels, angles, shafting, bars, and plates; annual capacity, 35,000 net tons. Idle. *See Furnaces.*

Westerman Rolling Mill, Westerman, Bruce & Co., Lockport, Niagara county. Built in 1870; 1 puddling furnace, 2 heating furnaces, and 2 trains of rolls; water-power; use scrap iron and some pig iron; product, hoops, bands, wire rods, horse-shoe iron, rounds, squares, hexagons, and fancy shapes; annual capacity, 3,000 net tons.

Wm. W. Wood, Wood's Falls, Clinton county. Rolling mill built in 1879-80; one 10-inch train of rolls, operated in connection with a forge; product, car-axles and bar iron. *See Forges.*

Number of rolling mills and steel works in New York: 26. Of these 1 is a Bessemer steel works, 4 are crucible steel works, 1 makes open-hearth steel, and 1 is a cementation steel works.

NEW JERSEY.

Adirondac Steel Works, H. J. Hopper, lessee, Jersey City. Originally built in 1847, and enlarged from 1863 to 1866; 2 forge fires, 7 heating furnaces, 6 hammers, 40 4-pot steel-melting holes, and 3 trains of rolls (one 9, one 12, and one 18-inch); 160 pots can be used at each heat in steel works; use Swedish and Northern New York charcoal wrought irons for melting; also reroll about 2,000 net tons of Bessemer and open-hearth steel billets annually; product, cast steel; annual capacity, 3,000 net tons. Steel brand, "Adirondac."

American Sheet Iron Works, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1867; enlarged in 1870, 1873, and 1882; 3 double puddling furnaces, 2 heating furnaces, 3 sheet-finishing furnaces, 3 annealing furnaces, 3 forge fires, 5 trains of 22-inch rolls, 1 hammer, and 1 rotary squeezer; product, black and galvanized sheet iron; annual capacity, 3,000 net tons of black sheet iron. Brand, "American R. G." Joseph C. Kent, President; George Danby, Secretary and Treasurer; Wm. E. Rees, Superintendent. *See Bloomeries.*

American Swedes Iron Company, Rockaway, Morris county. New York office, 44 Murray st. Operates the old Rockaway Rolling Mill, built in 1822; has 1 Wilson deoxidizer, to use ore in puddling furnaces by the Wilson direct process; 3 puddling furnaces, 1 heating furnace, 1 train of muck rolls, and 2 trains of finishing rolls; product, bars for steel purposes, made from black sand ore, mined at Block Island, R. I.; weekly capacity, 40 net tons. Burned in 1883; will be rebuilt. C. T. Reynolds, President; G. W. Thompson, Secretary; H. C. Reynolds, Treasurer. *See Forges.*

Boonton Iron Works, Estate of J. Couper Lord, John S. Schultze, General Manager, 59 Wall st., New York. Works at Boonton, Morris coun-

ty. Built in 1825; 12 double puddling furnaces, 11 heating furnaces, and 6 trains of rolls; 134 nail and spike machines; steam and water power; product, nails, spikes, nuts, and washers; annual capacity, 300,000 kegs of cut nails and spikes. (The name of Tooke Straker appeared in the last Directory as superintendent of these works, which was an error, as he was superintendent of only that part of the works which was leased by Joseph Wharton.)

Cumberland Nail and Iron Company, Bridgeton, Cumberland county.

Branch office, 43 North Water st., Philadelphia. Built in 1814; 10 double puddling furnaces, 4 heating furnaces, two 18-inch trains of rolls, and 84 nail machines; steam and water power; product, nails and gas tubes; annual capacity, 140,000 kegs of cut nails and 3,000 net tons of gas tubes. Robert J. Buck, President; Chester J. Buck, Vice-President; John M. Reeves, Secretary and Treasurer, 43 North Water st., Philadelphia. Agents for the sale of gas tubes, Getze & Reeves, 7 and 9 North Fifth st., Philadelphia.

Delaware Rolling Mill, F. P. Howe, Phillipsburg, Warren county. Built in 1865; 1 single and 6 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, (one 8-inch guide, one 16-inch puddle, and one 18-inch bar,) and 3 hammers; product, bar, guide, and angle iron; daily capacity, 50 to 60 net tons.

Dover Iron Works, Dover Iron Company of New Jersey, Dover, Morris county. Built about 1770, and rebuilt several times since; 4 double puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 10 and one 18-inch); steam and water power; product, merchant bar, boiler rivets, socket bolts, and brace jaws; annual capacity, 3,500 net tons merchant bar. Brand of merchant bar, "Dover Iron Co.;" brand of rivets, "D." George Richards, President; H. W. Crabbe, Secretary and Treasurer. Represented in New York city by Fuller, Bros. & Co., 139 Greenwich st.

Elizabethport Rolling Mill, Eames Petroleum Iron Company, Elizabethport, Union county. Office, 21 and 23 Nassau st., New York. Built about 1870; 4 heating furnaces and 2 trains of rolls (one 9 and one 16-inch); product, bar and angle iron, fish-plates, and spikes; annual capacity, 10,000 net tons. Idle.

Heller & Brothers, Newark, Essex county. Crucible steel works, built in 1882; 24 steel-melting holes; 48 pots can be used at each heat in steel works; product, crucible steel, used by the firm in the manufacture of tools, rasps, and files; annual capacity, 1,000 net tons.

Jersey City Spike and Bolt Works, W. Ames & Co., Washington, Morgan, and Steuben sts., Jersey City, Hudson county. Built in 1859; 2 heating furnaces and one train of rolls; use scrap iron only; product, spikes, splice joints, bolts, rivets, and round, flat, and square bar iron; annual capacity, 8,500 net tons.

Jersey City Steel Works, Jersey City Steel Company, Jersey City. Commenced operations August 1, 1862; 2 single and 2 double puddling furnaces, 22 heating furnaces, 5 trains of rolls, (two 9, one 12, one 16,

and one 18-inch,) 12 steam hammers, and 80 4-pot steel-melting holes; 320 pots can be used at each heat in steel works; product, cast steel solely; annual capacity, 14,000 net tons.

John A. Roebling's Sons Company, Trenton. Old mill built in 1852, new mill in 1873; 8 charcoal bloom fires, 5 heating furnaces, 4 trains of rolls, and one 3-ton steam hammer; product, wire rope and merchant rods; annual capacity, 9,000 net tons. Charles G. Roebling, President; F. W. Roebling, Secretary and Treasurer.

Newark Steel Works, Benjamin Atha & Co., Newark, Essex county. Began business in 1864; 36 4-pot steel-melting holes, one 7-gross-ton Siemens open-hearth steel furnace, 12 steam hammers, and 5 trains of rolls (two 8, one 9, one 12, and one 16-inch); 144 pots can be used at each heat in steel works; product, every kind of cast steel, except sheet; total annual capacity, 10,000 net tons. Brand, "Newark."

New Jersey Steel and Iron Company, Trenton, Mercer county. Built in 1845; 14 double puddling and 12 heating furnaces, 1 squeezer, 7 trains of rolls, (two 26, two 20, one 19, one 12, and one 8-inch,) and 1 hammer; steam and water power; product, beams, channels, angles, tees, merchant bars, and shapes; also, bridges and chains of all sizes; annual capacity, 25,000 net tons. Specialty, shapes. Brand, "Trenton." These works formerly belonged to the Trenton Iron Company, the present company having been formed in 1866. Edward Cooper, President; Edwin F. Bedell, Secretary, New York; Frederick J. Slade, Treasurer; Joseph Stokes, Superintendent, Trenton. Represented in New York by Cooper, Hewitt & Co., 17 Burling Slip.

Oxford Iron and Nail Company, Oxford, Warren county. Built in 1866; 26 puddling furnaces, 5 heating furnaces, 4 spike furnaces, 103 nail machines, and 4 trains of rolls (one 10, one 12, and two 23-inch); product, nails; annual capacity, 300,000 kegs. Theodore Sturges, President, 52 Wall st., New York; W. H. Scranton, General Manager, at the works. Sales agent, J. S. Scranton, 83 Washington st., New York. *See Furnaces.*

Passaic Rolling Mills, Passaic Rolling Mill Company, Paterson, Passaic county. New York office, Room 45, Astor House. Built in 1867, and incorporated in 1869; 8 double puddling furnaces, 6 heating furnaces, 3 trains of rolls, (one 20, one 18, and one 9-inch,) 3 hammers, and 1 squeezer; product, beams, channels, angles, tees, and other shapes for buildings and bridges, merchant bars, rivets, nuts, etc.; annual capacity, 15,000 net tons. Specialty, shapes. Brand, "Passaic." Watts Cooke, President; W. O. Fayerweather, Secretary and Treasurer. The company are also bridge-builders and contractors; annual capacity of bridge shop, 12,000 net tons.

Pompton Steel and Iron Company, Pompton, Passaic county. Built in 1863; owned by James Horner & Co. previous to 1877; 5 single puddling furnaces, 6 heating furnaces, 42 steel-melting furnaces, 2 trains of rolls, and 5 hammers; water and steam power; 160 pots can be used at each heat in steel works; product, crucible cast steel and rail-

- way car springs; annual capacity, 3,000 net tons. James Ludlum, President and Treasurer; Richard Wright, Secretary; Joseph W. McElroy, Superintendent.
- Powerville Iron Works, Joel Wilson, lessee, Dover, Morris county. Works at Powerville, Morris county. Built in 1845; 1 heating furnace and 2 trains of rolls; water-power; product, hoops, rods, and small bars to 2 inches in width; annual capacity, 1,000 net tons merchant iron. B. F. Howell, owner, Morristown. *See Bloomeries.*
- Solid Steel Casting Company, Mills Building, New York City. Works at North Newark, Essex county. Built in 1884. Product, steel castings.
- Trenton Iron Company, Trenton. Built in 1845; 1 run-out fire, 11 forge fires, 2 double puddling furnaces, 6 heating furnaces, 2 hammers, and 4 trains of rolls (one 8, one 10, one 12, and one 20-inch); wire works, with 897 blocks; product, bar iron, rods, and iron and steel wire. Abram S. Hewitt, President; Wm. Hewitt, Vice-President; James Hall, Treasurer; E. Hanson, Secretary. New York office, Cooper, Hewitt & Co., 17 Burling Slip. Philadelphia office, 21 North Fourth st.
- West Bergen Steel Works, Spaulding & Jennings, West Bergen, Hudson county. Built in 1880; 12 heating furnaces, 3 trains of rolls, (9, 10, and 18-inch,) 4 hammers, and 24 4-pot steel-melting holes; 96 pots can be used at each heat; product, crucible cast steel; annual capacity, 3,000 net tons. Reroll Bessemer and open-hearth billets.
- Woodside Steel Works, Belleville, Essex county. Crucible steel works, built in 1882-3.
- Number of rolling mills and steel works in New Jersey: 22. Of these 7 are crucible steel works, and 1 is an open-hearth steel works.

PENNSYLVANIA.

PHILADELPHIA AND VICINITY.

- Delaware Rolling Mills, Hughes & Patterson, Richmond and Otis sts., Kensington, Philadelphia. Built in 1870; 8 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, bar iron specialties; annual capacity, 15,000 net tons. Brand, "H. & P. Best," "H. & P. Best-Best," and "H. & P. Stay-Bolt."
- Fair Hill Forge and Rolling Mill, Gaulbert, McFadden & Caskey, York and America sts., Philadelphia. Built in 1854; 2 single and 2 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, and 1 hammer; product, merchant bar; annual capacity, 7,500 net tons. Ishmael James, Superintendent.
- Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot melting furnaces, and 3 steam hammers; 24 pots can be used at each heat in steel works; product, frog plates and points, and all kinds of steel forgings, and best American cast steel, suitable for shear knives, dies, taps, cold chisels, and lathe tools; annual capacity, 482 net tons.
- Frankford Steel Works, Adam Tindel, Frankford, Philadelphia. Built

in 1865 by Baldwin, Banes & Co., and put into operation under present management in February, 1880; 5 heating furnaces, 5 steam hammers from 2 tons to 600 pounds in weight, 7 forge fires for bar steel, and 20 2-pot steel-melting holes; 40 pots can be used at each heat in steel works; product, tool steel, die blocks, rolls, shear blades, and shapes; annual capacity, 500 net tons. Building one 5-ton Siemens-Martin open-hearth furnace for the production of steel for railroad axles, locomotive forgings, and hammered steel shapes of all kinds; annual capacity, 1,500 net tons of axles and 1,500 tons of general forgings. Will soon commence the erection of an additional hammer shop, to contain 5-ton hammers.

Gray's Ferry Iron Works, Edward S. Buckley, 209 South Third st., Philadelphia. Built in 1858 by the present owner; 3 double puddling furnaces, 4 charcoal forge fires, 3 heating furnaces, 2 trains of rolls, and 2 hammers; product, plate iron of all kinds and charcoal blooms; annual capacity, 4,000 net tons plates and 600 tons blooms. *See Charcoal Furnaces.*

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. Built in 1845; 11 double puddling furnaces, 8 heating furnaces, 7 trains of rolls, and 38 nail machines; product, nails, merchant bar, band, hoop, and skelp iron, and steel plow, cultivator, and shovel plate; annual capacity, 11,000 net tons. Brand, "Anvil."

Keystone Horse Shoe Company, Seventeenth and Clearfield sts., Philadelphia. Old mill put in operation January 1, 1873; partly torn down in 1884 by the Philadelphia, Germantown, and Chestnut Hill Railroad; 2 double puddling furnaces, 1 heating furnace, 1 train of 10-inch rolls, 1 hammer, and 1 Burden squeezer; only the heating furnace and the train of rolls are at present used; product, rounds and flats. In May, 1884, a new mill was completed on the north side of Clearfield st.; 2 heating furnaces, and a continuous train, consisting of one set of 3-high 16-inch roughing rolls, 1 pair of 16-inch strand rolls, 2 pairs of 10-inch rolls, and 4 pairs of 8-inch rolls. The design of the mill admits of the rolls being used as a continuous train, for the production of long lengths of hoop or fence strips, or they can be used as two trains by dispensing with the continuous method. George H. Boker, President; Wm. Gerhard, Secretary and Treasurer; W. G. Howell, Superintendent.

Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Front and Laurel sts., Philadelphia. Steel works at Tacony, Philadelphia. Founded in 1840, and commenced the manufacture of steel in 1854; 2 24-pot Siemens furnaces, 20 2-pot coal furnaces, and 3 4-pot coal furnaces; 100 pots can be used at each heat in steel works; 4 trains of rolls, (one 28-inch plate, one 20-inch 3-high sheet, and two 16-inch sheet,) 13 heating furnaces, and 1 hammer; product, principally saw steel of every description; also, tool steel, homogeneous steel, steel for engravers' plates, etc.; annual capacity, 4,836 net tons.

The steel works were originally built at Philadelphia, and were removed to Tacony in 1879, 1881, and 1883. Brand, "Disston." S. T. Williams, Manager; Samuel Disston, Sales Agent.

Midvale Steel Company, Nicetown P. O., Philadelphia. Built in 1866; two 12 and one 7-gross-ton Siemens open-hearth steel furnace, one 30-pot Siemens gas steel-melting furnace, 16 4-pot steel-melting coal fires, 20 bituminous and 12 anthracite gas producer fires, 12 coal and 6 gas heating furnaces, 8 hammers, (from 9 tons to 300 pounds weight,) one tire mill with monthly capacity of 1,200 tires, and 2 trains of rolls (one 23 and one 12-inch). The crucible steel department can use 94 pots at each heat. A well-equipped machine shop is attached, as well as moulding and annealing shops. The product is of open-hearth and crucible steel, consisting of locomotive tires, axles, miscellaneous forgings, and castings; tool, spring, machinery, and frog steel, and rolled steel shapes; also forgings and castings for ordnance purposes. Daily capacity, 75 net tons; annual capacity, 15,000 net tons. William Sellers, President; Marriott C. Smyth, Secretary and Treasurer; R. W. Davenport, Superintendent.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1842 on Frankford creek; began to make steel in 1845; removed to present location, 2 miles distant, in 1849; much enlarged in later years, especially in 1873; 5 heating furnaces, 3 trains of rolls, (one 12, one 14, and one 16-inch,) 2 hammers, 2 converting furnaces using wood exclusively, 2 converting furnaces using coal, and 24 2-pot crucible steel-melting furnaces; 48 pots can be used at each heat in steel works; convert Swedish iron into steel, reroll Norway iron, slit Norway nail rods, roll purchased Bessemer and Siemens-Martin steel, and make elliptic springs, sheet cast steel, cast spring steel, machinery and plow steel, and tire and sleigh steel; annual capacity, 4,500 net tons.

Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; 16 double puddling furnaces, 13 heating furnaces, rotary squeezer, and 5 trains of rolls (one 12, one 18, two 20, and one 23-inch); product, all shapes in either iron or steel, channel bars from 2 to 15 inches, beams from 4 to 15 inches, deck beams from 5 to 12 inches, tees, angle iron from 1 to 6 inches, hammered and rolled axles, bar and bridge iron, and shafting from 1 to 7 inches; the forge has 3 hammers; annual capacity, 30,000 net tons. Specialties, structural shapes, axles, shafting, and bridge iron. Brand, "Pencoyd." Percival Roberts and Percival Roberts, Jr.

Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard avenue, Philadelphia. Works at 1215 Beach st. Built in 1856; 7 single puddling furnaces, 5 heating furnaces, and 4 trains of 3-high sheet rolls; product, sheet iron; annual capacity, 7,500 net tons. Brands, "Penn Treaty," "Keystone," and "Ironsides." See *Upper Susquehanna Furnaces*.

Philadelphia Iron and Steel Company, 939 North Delaware avenue, Philadelphia. Built in 1845; 1 single and 3 double puddling furnaces, 1 rotary squeezer, 7 heating furnaces, and 5 trains of rolls (two 8, one 12, and two 18-inch); product, bar, angle, and tee iron, fish-plates, and peculiar shapes; average annual capacity, 10,000 net tons. John H. Bringhurst, President; George Lochman, Secretary and Treasurer.

Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna sts., Kensington, Philadelphia. Built in 1857; 8 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (two 9, one 17, and one 22-inch); product, all sizes and shapes of merchant bar, band, and skelp iron, and plates; annual capacity, 12,000 net tons. Brand, "S. R. Best." *See Schuylkill Valley Furnaces.*

Winch's Rolling Mill, Spike, and Bolt Works, Corydon Winch, Canal st. and Germantown avenue, Philadelphia. Built in 1874; 4 heating furnaces, 4 trains of rolls, and 12 spike machines; product, merchant bar iron, fish-plates, bolts, nuts, and spikes; average annual product, 3,500 net tons.

Number of rolling mills and steel works in Philadelphia and vicinity: 15. Of these 5 are crucible steel works, and 1 is an open-hearth steel works. One open-hearth steel plant is building.

EASTERN PENNSYLVANIA, EXCEPT PHILADELPHIA.

Allentown Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown, Lehigh county. Built in 1860; 2 single and 23 double puddling furnaces, 12 heating furnaces, and 8 trains of rolls; product, T and street rails from 16 lbs. upwards, fish-plates, merchant bars, angles, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars. A. Pardee, Jr., President; H. W. Allison, Secretary and Treasurer; C. H. Nimson, Superintendent. *See Glen Iron Works. See Lehigh Valley Furnaces.*

Bailey & Shoemaker, Pine Iron Works, Berks county. Two mills: Glendale Rolling Mill, at Manatawny Station, Berks county. Built in 1881-2; 2 heating furnaces and 1 train of rolls, 84 in. x 24 in. Pine Iron Works, at Pine Iron Works, Berks county. Built in 1845; 2 heating furnaces and 1 train of rolls, 72 in. x 18 in. Product of both mills, plate iron; total annual capacity, 6,100 net tons. Sole manufacturers of the "Pine" brands of extra flange and fire-box iron.

Bethlehem Iron Company, Bethlehem, Northampton county. Established in 1863. Mill No. 1 started in 1863; 1 single and 12 double puddling furnaces, 9 heating furnaces, one 22-inch train of rolls for steel rails and billets, one 12-inch train for steel billets and small shapes, and one 21-inch train for puddled iron; product, steel rails and billets and muck bar; annual capacity, 45,000 net tons. Mill No. 2, started in 1873; four 7-gross-ton Bessemer steel converters; first blow made October 4, 1873; first steel rail rolled October 18, 1873; 8 iron cupolas and 4 spiegel cupolas; 10 Siemens heating furnaces; one 48 and two 32-inch trains of blooming rolls; one 25-inch train for

steel rails; product, steel rails and blooms; annual capacity, 200,000 net tons. In course of erection one 28-inch train for steel rails, beams, heavy shapes, etc. In course of erection in Mill No. 2: Siemens-Pernot open-hearth steel plant, consisting of two 15-gross-ton furnaces, 1 Siemens heating furnace, 12 gas producers, 2 hydraulic hoists, cranes, etc. Machine shop, blacksmith shop, and foundry connected with the works. G. B. Linderman, General Manager; Alfred Hunt, President; Wm. W. Thurston, Vice-President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer; John Fritz, Superintendent. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro, Berks county. Built in 1848; 2 single and 11 double puddling furnaces, 2 scrap and 4 heating furnaces, 113 nail machines, and 5 trains of rolls; steam and water power; product, nails; annual capacity, 250,000 kegs. Brand, "Anchor." George Brooke, President; R. T. Leaf, Secretary; George W. Harrison, Treasurer. *See Schuylkill Valley Furnaces. See Charcoal Furnaces.*

Blandon Iron Works, Maidencreek Iron Company, Blandon, Berks county. Office, 40 North Sixth st., Reading, Pa. Built in 1867; 11 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, round, square, flat, hoop, band, and skelp iron; annual capacity, 8,000 net tons. H. A. Kaufman, Manager; Z. H. Maurer, Treasurer.

Brandywine Rolling Mills, Worth Brothers, Coatesville, Chester county. Built in 1881-2, and put in operation in February, 1882; 3 double puddling furnaces, 3 heating furnaces, 2 trains of rolls (one 28 x 90-inch plate, and one 20-inch muck train to make 4 x 6-inch bars); product, plate iron and muck bar; annual capacity, 6,000 net tons of plate iron.

Bristol and Hamburg Rolling Mills, Nevegold, Scheide & Co., Bristol, Bucks county. Two mills: Bristol Rolling Mill, at Bristol, built in 1875-6; 2 heating furnaces, 2 trains of rolls, (one 8 and one 12-inch,) and 1 "continuous" hoop train. Hamburg Rolling Mill, at Hamburg, Berks county, built in 1865; 7 double puddling furnaces, 1 cupola furnace, 2 heating furnaces, 1 rotary squeezer, one 3-ton steam hammer, and 2 trains of rolls (10 and 18-inch). Product, bar, band, hoop, and scroll iron, and muck and scrap bars. Total annual capacity, 9,500 net tons. Brand, "Bristol Mills."

Carbon Rolling Mill Company Limited, Mauch Chunk. Works at Weissport, Carbon county. Built in 1860-4, and rebuilt in 1872; 1 single and 4 double puddling furnaces, 2 heating furnaces, 1 squeezer, and 3 trains of rolls (16-inch muck, 10-inch bar, and 8-inch bar); product, round, square, flat, and oval bar iron; annual capacity, 8,000 net tons. William Lilly, Chairman; J. M. Dreisbach, Secretary and Treasurer. Sales agents, Justice Cox, Jr., & Co., 224 South Fourth st., Phila.

Catasauqua Manufacturing Company, Catasauqua, Lehigh county. Company organized in 1864. Two mills: Catasauqua Mill at Catasauqua, and Ferndale Mill at Ferndale; 30 single puddling furnaces, 11 heat-

- ing furnaces, 9 trains of rolls, (one 8, two 10, one 15, three 18, one 21-inch, and one 22-inch plate train,) and one 10-ton hammer; product, highest grades of bar, tank, and boiler iron, rolled car-axes, angles, skelp iron, steel boiler and shovel plate, steel tires, steel angles, steel shafting, and merchant bar steel; annual capacity, 30,000 net tons. Specialty, rolled fibrous steel railway car-axes, stronger than iron, more reliable than steel. Brands of iron, "Catasaquua," "Catasaquua Rivet," and "Catasaquua Stay-bolt;" brand of steel, "Catasaquua Fibrous Steel." Oliver Williams, President; John Williams, Secretary; Henry Davis, Treasurer. Philadelphia office, Justice Cox, Jr., & Co., agents, 224 South Fourth st.; New York office, E. T. Day, agent, 95 Liberty st.
- Chester Rolling Mills, Thurlow, Delaware county. Built in 1874-5; 11 double puddling furnaces, 5 heating furnaces, of which 2 are Siemens heating furnaces, and 7 trains of rolls (one 18-inch puddle, one 24-inch puddle, one "universal" train, two 20-inch plate or groove, and two 30-inch plate, one of the latter being 72 inches long and the other 100 inches long); product, tank, ship, bridge, and boiler plate iron; annual capacity, 20,000 net tons. Open-hearth steel plant added in 1881-2, consisting of two 15-gross-ton Siemens furnaces; annual capacity, 10,000 net tons of ship and boiler plates. John Roach, President; R. Peters, Jr., Secretary; C. B. Houston, Treasurer; T. J. Houston, General Manager. Philadelphia office, 216 South Third st. Selling agents, Geo. O. Wales, Boston; Wm. H. Wallace & Co., New York; W. H. Sproul, Thurlow, Pa. *See Schuylkill Valley Furnaces.*
- Chester Steel Castings Company, 407 Library st., Philadelphia. Works at Chester, Delaware county. Built in 1871; 2 cupolas and 8 annealing furnaces; product, steel castings by the McHaffey process. E. P. Dwight, President and Treasurer; W. W. Wood, Secretary; J. J. Deemer, Superintendent.
- Coatesville Iron Company, Coatesville, Chester county. New York office, 130 Cedar st. Built in 1838; 4 double and 3 single puddling and 6 heating furnaces, 4 trains of rolls, and 1 hammer; product, all kinds of boiler, fire-box, boat, tank, tube, and flue iron; annual capacity, 11,000 net tons. Formerly called Viaduct Iron Works. Andrew Williams, President; George Brooke, Vice-President; W. J. Carmichael, Treasurer and General Manager, New York; Edgar W. Emmons, Secretary, New York.
- Combination Steel and Iron Company, Chester, Delaware county. Built in 1881; 8 heating furnaces and 3 trains of rolls (22, 20, and 12-inch); product, iron-clad steel bars, plates, angles, rivets, etc.; annual capacity, 8,000 net tons of structural iron. John Roach, President; G. E. Weed, Treasurer; C. A. Weed, General Manager.
- Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood & Brothers, Conshohocken, Montgomery county. Office, 223 North Second st., Philadelphia. Built in 1832, 1852, and 1864, respectively; rebuilt in 1882-3; 6 double puddling furnaces, 7 heating furnaces, and 7

- 20-inch trains of rolls ; steam and water power ; product, plate and sheet iron, embracing flue, boiler, tank, gasometer, nail, tack, shovel, and safe iron ; annual capacity, 7,000 net tons. Brands, "Anchor," "Hope," and "R. G."
- Easton Sheet Iron Works**, Reilly & Oliver, Easton, Northampton county. Built by Samuel Oliver, deceased, and started February 1, 1872 ; have been in constant operation since ; 1 double and 1 single puddling furnace, 1 heating furnace, 1 anthracite-coal sheet furnace, 1 bituminous-coal annealing furnace, and 1 train of 22-inch rolls ; product, bloom and refined sheet iron ; annual capacity, 1,000 net tons. Production sold by Marshall Lefferts & Co., 90 Beekman st., New York.
- Ellis & Lessig**, Pottstown, Montgomery county. Building a rolling mill and nail factory, to contain 50 nail machines, 2 heating and 6 puddling furnaces, and 2 trains of rolls.
- Eureka Cast Steel Company**, Lamokin, one mile south of Chester, Delaware county. Built in 1877 ; product, steel castings of all kinds ; specialty, steel propellers and railroad castings. John A. Emereck, President ; W. H. Dickson, Secretary and Treasurer.
- Gibraltar Iron Works**, S. Seyfert & Co., Reading. Built in 1846, and completely rebuilt in 1883-4, and new machinery erected ; 2 heating furnaces and one 18-inch train of rolls ; product, boiler plate and boiler tube and pipe iron ; annual capacity, 3,000 net tons. *See Bloomaries.*
- Glasgow Iron Works**, Glasgow Iron Company, Pottstown, Montgomery county. Puddle mill built in 1874 ; 6 double puddling furnaces and 1 train of muck rolls ; water-power ; annual capacity, 8,000 net tons. Plate mill added in March, 1876 ; steam-power ; 3 heating furnaces and one train of rolls 96 inches long ; annual capacity, 8,000 net tons of boiler plate. Specialties, "S. B. F." and "S. B. F. B." Joseph L. Bailey, President ; Comly B. Shoemaker, Treasurer ; G. W. Nicolls, Secretary ; Edward Bailey, General Manager.
- Glen Iron Works**, Allentown Rolling Mills, lessee, Allentown. First put in operation in 1870 ; 8 double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8½ and two 15-inch) ; product, puddled bar ; annual capacity, 7,500 net tons. *See Allentown Rolling Mills. See Lehigh Valley Furnaces.*
- Greenwood Rolling Mill**, L. H. Allen, owner, Tamaqua, Schuylkill county. Built in 1865 ; 5 single puddling furnaces, 2 heating furnaces, 2 trains of rolls, (8½ and 16-inch,) and a pair of shears ; annual capacity, 4,500 net tons. For sale.
- Keystone Iron Works**, Reading, Berks county. Built in 1857 ; 1 double and 5 single puddling furnaces, 2 heating furnaces, and one 18-inch train of rolls ; product, boiler plate, skelp, tank, chute, stack, pipe, boat, and car iron, and muck bars ; annual capacity, 3,600 net tons. Owners, J. V. Craig, Jacob Snell, and J. H. Craig.
- Laurel Iron Works**, Carmichael & Emmens, 130 Cedar st., New York. Works at Coatesville, Chester county. Built in 1825 ; 1 annealing fur-

- nace, 3 heating furnaces, and 2 trains of rolls; water and steam power; product, flue and tube iron; annual capacity, 6,000 net tons. J. W. Andrews, Superintendent.
- Lehigh and Franklin Wire Mills, Stewart & Co., Easton, Northampton county. Built in 1837; 4 heating furnaces and 3 trains of rolls; product, wire rods, drawn into wire at the same establishment; annual wire-drawing capacity, 12,000 net tons.
- Longmead Iron Works, Jawood Lukens, Conshohocken, Montgomery county. Built in 1882, and put in operation in November, 1882; 5 double puddling furnaces and 1 train of 20-inch rolls; product, muck bar; annual capacity, 6,600 net tons.
- Lukens Rolling Mills, Charles Huston & Sons, Coatesville. Built in 1810; 3 double puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 1 hammer; steam and water power; product, all kinds of boiler and ship plates, flue and bridge iron, and homogeneous steel plates; annual capacity, 11,000 net tons. The puddle mill, operated by steam and water power, occupies the site of the first plate mill built in the United States.
- McIlvain (Wm.) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. First put in operation in 1857; 2 double and 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (break-down rolls, 52 in. x 25 in., and finishing rolls, 81 in. x 25 in.,) and one 3-ton hammer; product, every variety of plate iron; annual capacity, 6,000 net tons. Brand, "McIlvain." *See Bloomaries.*
- Milldale Iron Company, Port Clinton, Schuylkill county. Built in 1868; 1 single and 2 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 10, one 16, and one 18-inch); water and steam power; product, merchant bar, guide iron, tee, channel, and angle iron; annual capacity, 2,500 net tons. Formerly called Little Schuylkill Rolling Mill. Leased by W. L. McDowell and J. Barclay Hacker.
- Norristown Iron Works, James Hooven & Son, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, (10, 18, and 18-inch,) and 1 hammer; product, skelp iron, part of which is made by the firm into butt-welded pipes, and the remainder sold; annual capacity, 5,000 net tons. James Hooven, owner. *See Schuylkill Valley Furnaces.*
- Palo Alto Rolling Mill, estate of Benjamin Haywood, deceased, Pottsville, Schuylkill county. Built in 1854; 12 double and 5 single puddling furnaces, 9 heating furnaces, and 5 trains of rolls (one 8, two 16, and two 18-inch); product, light and heavy T and street rails, fish bars, chairs, and merchant bar iron; annual capacity, 15,000 net tons. Brand, "P. A." Idle for the past four years. R. F. Lee, Executor.
- Parkesburg Iron Works, Parkesburg Iron Company, Parkesburg, Chester county. First started in April, 1873; 4 double puddling furnaces, 6 charcoal finery fires, 3 heating furnaces, 1 train of rolls, and 2 hammers; product, boiler plate and tube skelp; annual capacity, 4,000 net tons. Horace A. Beale, President; Wm. H. Gibbons, Vice-President;

Amos Michener, Secretary ; Samuel R. Parke, Treasurer ; A. J. Williams, Superintendent.

Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Company, W. E. C. Coxe, Superintendent, Reading. Built in 1868 ; 12 single puddling furnaces, 10 heating furnaces, and 3 trains of rolls (one 12, one 23, and one 24-inch) ; product, rails, splice bars, and muck bars ; annual capacity, 50,000 net tons. Specialty, reheated iron rails. Bessemer steel rails are rolled from purchased blooms. Brand, "P. & R." *See Schuylkill Valley Furnaces. See Virginia Furnaces. See Port Carbon Iron Works.*

Phoenix Iron Works, Phoenix Iron Company, Phoenixville, Chester county. Office, 410 Walnut st., Philadelphia. Built in 1808 ; 21 double puddling furnaces, 32 heating furnaces, and 8 trains of rolls (one 2-high 18, one 3-high 9, one 3-high 16, one 3-high 26, two 3-high 18, and two 3-high 20-inch) ; product, bar iron, beams, angles, tee iron, other shapes, and rails. New mill built in 1873 ; now working one 13 and two 20-inch 3-high trains on bar and structural iron, 4 small and 5 large double Siemens heating furnaces, 24 Siemens gas producers using anthracite coal, and 20 Wilson gas producers using anthracite coal ; present annual capacity, 50,000 net tons. David Reeves, President ; W. H. Reeves, General Superintendent ; Geo. Gerry White, Secretary ; James O. Pease, Treasurer. *See Schuylkill Valley Furnaces.*

Plymouth Rolling Mill Company, S. Fulton, General Superintendent, 261 South Fourth st., Philadelphia. Works at Conshohocken, Montgomery county. Built in 1881-2 ; product, muck bar, plate iron, and sheet iron. *See Schuylkill Valley Furnaces.*

Port Carbon Iron Works, Philadelphia and Reading Coal and Iron Company, Port Carbon, Schuylkill county. Eight double puddling furnaces, 1 large heating furnace, 2 small heating furnaces, 2 spike machines, and 2 trains of rolls (16-inch puddle train and 10-inch merchant train) ; annual capacity, puddled bar, 9,500 net tons ; merchant bar, 2,500 net tons ; spikes, 1,500 net tons. Foundry and machine shop attached. Formerly leased by the Pottsville Iron and Steel Company. *See Philadelphia and Reading Rolling Mill. See Schuylkill Valley Furnaces. See Virginia Furnaces.*

Pottsgrove Iron Works, Potts Brothers Iron Company Limited, Pottstown, Montgomery county. Built by Henry Potts & Co. in 1846 ; 6 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls (muck train and plate train) ; product, plate iron, comprising boiler, tank, pipe, and flue iron, and muck bar ; annual capacity, 8,000 net tons of muck bar and 8,000 tons of plate iron. Specialties, pipe and flue iron. George H. Potts, Chairman ; H. C. Hitner, Secretary and Treasurer.

Pottstown Iron Company, Pottstown, Montgomery county. Built in 1863 and extended in 1867 ; 29 double puddling furnaces, 4 Siemens heating furnaces, 6 forge fires, 95 nail machines, 1 hammer, 3 squeezers, and 7 trains of rolls (one 18-inch muck, one 21-inch muck, two 23-inch

muck, one 23-inch nail plate, one 25-inch plate, and one 31-inch plate); product, charcoal blooms, muck bar, and nails, and boiler, ship, and tank plate iron; annual capacity, 35,000 net tons of muck bar, 2,500 tons of blooms, 24,000 tons of plate iron, and 360,000 kegs of nails. The company is now erecting a 24-inch universal mill, with 2 Siemens heating furnaces, for making bridge and ship plates. Theo. H. Morris, President; Andrew Wheeler, Vice-President; Joseph K. Wheeler, Secretary; Wm. H. Morris, Treasurer and General Manager. *See Schuylkill Valley Furnaces.*

Pottsville Rolling Mills, Pottsville Iron and Steel Company, Pottsville. Old mill built in 1852, and rebuilt in 1863; 10 double puddling furnaces, 12 heating furnaces, 1 hammer, and 3 trains of rolls. Built originally to make rails, and altered to roll shapes in 1877. New mill built in 1879, containing a 23-inch train of rolls; product, structural iron of all kinds; total annual capacity, 30,000 net tons. C. M. Atkins, President; William Atkins, Treasurer; C. H. Dengler, Secretary. *See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh, Reading. Established in 1865; enlarged in 1872 and 1881; 4 heating furnaces, 3 trains of rolls, (one 9, one 10, and one 12-inch,) and 1 hammer; product, refined merchant bar, band, and skelp iron; also, bolts, nuts, washers, rivets, etc.; annual capacity, about 8,000 net tons.

Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. Flue-iron mill built in 1836; 12 single puddling furnaces, 4 heating furnaces, 1 rotary squeezer, 3 trains of rolls, 28 nail machines, and 1 spike machine; product, cut nails, bar, band, hoop, and skelp iron; annual capacity, 7,000 net tons. Plate mill built in 1863; 8 double puddling furnaces, 4 heating furnaces, 1 hammer, and 4 trains of rolls; product, sheet, plate, and bar iron; annual capacity, 10,000 net tons. Edward W. Coit, President; Thomas R. Elcock, Vice-President; F. W. Ralston, Treasurer; Henry M. Keim, Clerk. *See Schuylkill Valley Furnaces.*

Schuylkill Haven Rolling Mill, Schuylkill Haven Iron Company, Pottsville. Mill at Schuylkill Haven, Schuylkill county. Put in operation October 1, 1873; 2 heating furnaces, 2 trains of rolls, (one 10 and one 16-inch,) and 1 railroad spike, bolt, and rivet machine; product, merchant bar iron, small T rails for mining purposes, railroad spikes, bolts, and rivets; specialty, refined merchant bar iron; annual capacity, 6,000 net tons. Also, chain works with 24 hearths, testing machine, etc. L. W. Weissinger, President; C. F. Rahn, Treasurer.

Schuylkill Iron Works, Alan Wood & Co., Conshohocken, Montgomery county. Office, 519 Arch st., Philadelphia. Built in 1858; 15 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, 1 hammer, and 2 rotary squeezers; product, sheet and plate iron; annual capacity, 15,000 net tons. Partners are, Alan Wood, Jr., Howard Wood, and Charles Lukens. *See Rolling Mills in Delaware.*

Seyfert Rolling Mills, Samuel R. Seyfert, Reading, Berks county. Works

at Seyfert Station, W. & N. R. R. Built in 1880-1, and started in March, 1881; 4 double puddling furnaces, 4 forge fires, 3 heating furnaces, one 4-ton hammer, and 2 trains of rolls; product, boiler-plate, boiler-tube, and pipe iron, blooms, and puddled bar; annual capacity, 5,000 net tons.

Standard Iron Company Limited, Norristown, Montgomery county. Built by Wm. Schall in 1857; 11 double puddling furnaces, 1 rotary squeezer, and 2 trains 18-inch puddle rolls; product, puddled bar; annual capacity, 14,000 net tons. Walter H. Cooke, Chairman; John Slingsluff, Secretary and Treasurer.

Standard Steel Casting Company, Thurlow, Delaware county. Built in 1883-4, and first put in operation in March, 1884; one 10-ton Siemens-Martin open-hearth steel furnace; annual capacity, 9,000 net tons; one 18-pot steel-melting furnace; annual capacity, 500 net tons; product, open-hearth and crucible steel castings. Pedro G. Salom, President; Wm. E. Trainer, Vice-President; John B. Booth, Secretary; Richard Wetherill, Treasurer; Joseph Casho, Superintendent.

Stony Creek Rolling Mill, J. H. Boone, Norristown, Montgomery county. Built in 1849, and rebuilt in 1879; 4 double puddling and 3 heating furnaces, and 2 trains of rolls; product, plate iron.

Thorndale Iron Works, Thorndale Iron Works Company, Wm. L. Bailey, Secretary and Treasurer, Thorndale P. O., Chester county. Built in 1847; 4 double puddling furnaces, 2 heating furnaces, 2 trains of rolls, (plate train 73 inches long,) and 1 crocodile squeezer; product, boiler and tank iron and ship plates; annual capacity, 4,000 net tons. Brand, "Thorndale." Charles L. Bailey, President; Abraham S. Patterson, Vice-President. Selling agents, Morris, Wheeler & Co. and J. F. Bailey, Philadelphia; W. H. Wallace & Co., New York; G. G. Wilder, Jr., Boston; Corning & Co., Albany, N. Y.

Valley Iron Works, C. E. Pennock & Co., Coatesville, Chester county. Built in 1837; 4 double puddling and 4 heating furnaces, one 4-ton hammer, and 4 trains of rolls (one 18, one 24, and two 30-inch); product, plate iron; annual capacity, 7,000 net tons.

Number of rolling mills and steel works in Eastern Pennsylvania except Philadelphia: 50 completed, and 1 building. Of these 1 makes Bessemer steel, 2 make open-hearth steel, 1 makes crucible steel, 1 open-hearth steel plant building, and 2 make cast-steel castings solely.

CENTRAL DISTRICT.

Altoona Iron Company, Altoona, Blair county. Built in 1872-3; put in operation in April, 1873; additions made in 1878, 1879, and 1881; 11 double and 6 single puddling furnaces, 4 heating furnaces, 4 trains of rolls, (two 8, one 16, and one 18-inch,) 1 rotary squeezer, and one 3-ton steam hammer; product, bar, band, hoop, ovals, half ovals, half round, and scroll iron; annual capacity, 15,000 net tons. Light irons a specialty. Brand, "Altoona." James Gardner, President; T. S. Gardner, Treasurer; S. C. Baker, General Manager.

Bellefonte Iron and Nail Company Limited, Bellefonte, Centre county. Built in 1881-2; put in operation March 1, 1882; 11 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, (one 9 and one 15-inch bar train and one 16-inch nail-plate train,) and 30 nail machines; product, bar iron, spikes, and nails; annual capacity, 65,000 kegs of cut nails and 6,000 net tons bar iron and spikes. James A. Beaver, Chairman; William V. Emery, Secretary and Treasurer; Samuel Achenbach, General Superintendent.

Bellefonte Iron Works, Valentines & Co., Bellefonte, Centre county. Built in 1800; 1 heating furnace and 1 train of rolls; steam and water power; product, covers for boiler-plate piles, billets for wire rods, scythe and shovel bars, etc.; annual capacity, 3,600 net tons. *See Charcoal Furnaces. See Bloomaries.*

Berwick Rolling Mill, Jackson and Woodin Manufacturing Company, Berwick, Columbia county. Built in 1872; 11 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 7,000 net tons. Also manufactures cars and car-wheels. C. R. Woodin, President; Garrick Mallery, Vice-President; C. H. Zehnder, Secretary; H. F. Glenn, Treasurer; R. W. Oswald, General Superintendent.

Central Iron Works, Harrisburg, Dauphin county. Old mill built in 1853 by Charles L. Bailey & Bro., and changed and enlarged in 1879; new mill built in 1877-8, and enlarged in 1881; 1 single and 7 double puddling furnaces, 1 squeezer, 5 heating furnaces, and 5 trains of rolls, (one muck, one 31-inch and one 25-inch roughing, one Lauth 3-high 31-inch and one Lauth 3-high 25-inch chilled finishing,) with shears, cranes, etc.; product, boiler plate and tank iron; annual capacity, 13,000 net tons. Charles L. Bailey, President; A. Wilhelm, Vice-President; Wm. E. Bailey, Secretary; G. M. McCauley, Treasurer.

Chesapeake Nail Works, Chas. L. Bailey & Co., Harrisburg, Dauphin county. Built in 1867; 18 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, (20-inch puddle and 16-inch plate,) and 103 nail machines; product, nails; annual capacity, 250,000 kegs.

Chickies Rolling Mill, Becker & Reinhold, Chickies, Lancaster county. Built in 1865; 1 single and 3 double puddling furnaces and 2 trains of rolls (9 and 16-inch); product, muck bar; annual capacity, 4,000 net tons.

Danville Nail Works, Danville Nail and Manufacturing Company, Danville, Montour county. Built in 1883, and first nails made August 31, 1883; 4 double puddling furnaces, one 30-ton heating furnace, 2 trains of rolls, (18-inch puddle and 18-inch plate,) and 41 nail machines; product, iron and steel nails; annual capacity, 90,000 kegs. D. M. Boyd, President; William C. Frick, Secretary and Manager; R. M. Grove, Treasurer.

Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race st., Philadelphia. Built in 1836; 16 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, (8, 16, 18, and 20-inch,) and 64 nail ma-

chines; steam-power; product, bar iron and nails; annual capacity, 5,000 net tons of bar iron and 135,000 kegs of nails. Specialty, bar iron. John Wister, Jr., President and Treasurer; William E. S. Baker, Secretary and Assistant Treasurer. *See Upper Susquehanna Furnaces.*

Eagle Iron Works, Curtins & Co., Roland, Centre county. Built in 1825 by Roland Curtin & Sons, and in possession of the Curtins alone ever since; 1 single puddling furnace, 1 heating furnace, 2 trains of rolls, and 1 squeezer; water-power; product, wire billets, boiler-plate pile covers, and assorted bar iron from $\frac{1}{2}$ -inch round and square to 4-inch tire; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

Franklin Iron Works, Franklin Iron Company Limited, lessee, Lancaster, Lancaster county. Works at Rohrerstown. Enlarged in June, 1872; 1 double and 5 single puddling furnaces, 1 heating furnace, and 2 trains of rolls; product, merchant bar iron and muck bars; annual capacity, 4,000 net tons. W. G. Mendinhall, Chairman; G. Albert Smith, Secretary and Treasurer.

Glendower Iron Works, Danville, Montour county. Built in 1847; 14 single puddling furnaces, 8 heating furnaces, and 4 trains of rolls; product, railroad iron, street rails, and merchant and muck-bar iron; specialty, merchant bar iron; annual capacity, 20,000 net tons. Mrs. Hugh E. Steele, owner.

Green Ridge Iron Works, A. L. Spencer, Scranton, Lackawanna county. Built at Providence, Pa., in 1876; removed to Green Ridge, Scranton, in 1879; 1 heating furnace and 2 trains of rolls; product, bar iron, car-axles, 25-lb. mine rails, toe-calk steel, and bar steel; annual capacity, 1,200 net tons of bar iron and 2,000 net tons of rails. W. B. Borst, Superintendent.

Grove, Grier & Co. Limited, Danville, Montour county. Philadelphia office, 330 Walnut st. Puddle mill built in 1871, with 8 single puddling furnaces and 1 train of 18-inch rolls; furnaces removed in 1882, and one 20-gross-ton Siemens open-hearth steel furnace erected; 6 heating furnaces; one 84 x 28-inch plate train and one 48 x 22-inch sheet train; product, steel boiler, tank, and boat plates, and sheet steel. Annual capacity, 5,000 net tons of plates and 1,000 tons of sheets. Rail mill built in 1873, with 6 heating furnaces and 1 train of 19-inch rolls; remodeled in 1881 for rolling Bessemer steel blooms into rails; now used for rolling bar iron. R. M. Grove, Chairman; J. K. Grier, Vice-President; Wm. Selfridge, Secretary and Treasurer; L. K. Rishel, Manager. Edward Samuel, selling agent, Philadelphia.

Harrisburg Nail Works, McCormick estate, Harrisburg. Works at Fairview, Cumberland county, on the Northern Central Railway. Built in 1810; 9 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 78 nail machines; steam and water power; product, nails and muck bar; annual capacity, 7,500 net tons of nails and 2,000 tons of muck bar. Henry McCormick, Treasurer.

Harrisburg Steel and Iron Works Limited, Hummel, Fendrich & Co.,

Harrisburg. First put in operation October 16, 1881; 2 heating furnaces and 2 trains of rolls (one 9 and one 18-inch); product, horse-shoe steel and iron, wagon and carriage tire, nut, bolt, and rivet iron, and other specialties; annual capacity of finished iron, 4,000 net tons, and of semi-steel, 1,000 net tons. V. Hummel, President; R. H. Hummel, Secretary; J. L. Fendrich, Treasurer; E. B. Edwards, Superintendent. Idle and for sale.

Hollidaysburg Iron and Nail Company, Hollidaysburg, Blair county. Built in 1860; 1 double and 6 single puddling furnaces, 3 heating furnaces, 4 trains of rolls, (one 8, one 16, and two 18-inch,) and 23 nail machines; product, merchant bar, angle, skelp, and hoop iron, and cut nails and spikes; annual capacity, 60,000 kegs of cut nails and 3,000 net tons of other products. J. D. Hemphill, President; J. W. Bracken, Treasurer and General Manager; Thomas F. Johnston, Secretary.

Howard Iron Works, Bernard Lauth, Howard, Centre county. Built in 1840; 6 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls, (one 16-inch, one 12-inch, and 1 rod mill,) and 1 rotary squeezer; water-power; product, carriage bolts. *See Charcoal Furnaces. See Bloomeries.*

Johnson (Reuben) & Co., Northumberland, Northumberland county. Built in 1883, and first put in operation in January, 1884; 10 double puddling furnaces, 2 heating furnaces, 2 20-inch trains of rolls, and 50 nail machines; product, nails; annual capacity, 100,000 kegs.

Juniata Rolling Mill, Denniston, Porter & Landis, Hollidaysburg. Built in 1866; 16 single puddling and 3 heating furnaces, 2 trains of rolls, 30 nail machines, and 1 hammer; product, bar and pipe iron and cut nails and spikes; annual capacity, 9,000 net tons. Howard C. Porter, President; James Denniston, Treasurer; A. S. Landis, Attorney.

Lackawanna Iron and Steel Works, Lackawanna Iron and Steel Company, Scranton, Lackawanna county. Commenced in 1840; 42 single puddling furnaces, 33 heating furnaces, and 10 trains of rolls, (one 31, one 36, three 23½, two 20, two 18, and one 12-inch,) and 2 hammers; steam-power; product, light and heavy railroad rails, merchant bars, and car-axles; annual capacity, 185,000 net tons of steel and iron rails and 15,000 tons of iron and steel merchant bars and car-axles. Bessemer steel works added in 1875; two 5-gross-ton converters, 4 cupolas, and 3 spiegel furnaces; annual capacity, 168,000 net tons ingots; first blow made October 23, 1875; first steel rail rolled December 29, 1875. Brand, "Lackawanna." E. F. Hatfield, Jr., President, 52 Wall st., New York; H. V. Vultee, Secretary, New York; Edward C. Lynde, Assistant Secretary, Scranton, Pa.; Theodore Sturges, Treasurer, New York; Charles F. Mattes, General Manager; Theodore G. Wolf, Superintendent of steel rolling mill; Charles F. Manness, Superintendent of steel converting works. *See Upper Susquehanna Furnaces.*

Lebanon Iron Company, Lebanon, Lebanon county. Built in 1882-3; 6 double puddling furnaces and 2 20-inch trains of rolls; product, muck bar; annual capacity, 10,000 net tons. Robert H. Coleman, President;

A. Hess, Secretary and Treasurer; and Thomas Evans, Superintendent.

Lebanon Rolling Mills, Samuel E. Light, Lebanon. Built in 1867; 4 double puddling furnaces, 5 heating furnaces, 5 forge fires, 3 trains of plate and sheet rolls and 1 train of muck rolls, and 2 hammers; product, plates up to 65 inches wide and from No. 18 to one inch thick, and sheet iron; annual capacity, 6,500 net tons. *See Bloomaries.*

Lewisburg Nail Works, Lewisburg, Union county. Building a rolling mill and nail works to contain 2 double puddling furnaces, 1 heating furnace, 1 train of rolls, and 17 nail machines; to be completed and put in operation in November, 1884; product, iron and steel nails; estimated daily capacity, 125 kegs. T. H. Croft, President and Manager; T. H. Purdy, Treasurer; E. M. Purdy, Secretary.

Lochiel Rolling Mill, J. D. Cameron, owner, Harrisburg. Built in 1865; merchant mill completed in November, 1871. Puddle mill contains 10 double puddling furnaces and one 3-high set of 19-inch puddle rolls. Bar mill contains 4 heating furnaces and 2 trains of rolls (9 and 16-inch); annual capacity, 10,000 net tons of merchant bar. Rail mill contains one 3-high 19½-inch rail train for rolling steel rails from cold blooms. Formerly owned by the Lochiel Rolling Mill Company. Idle.

Logan Iron and Steel Works, Logan Iron and Steel Company, Lewistown, Mifflin county. Office, 218 South Fourth st., Philadelphia. Built in 1869, 1877, and 1879; rebuilt in 1882; 1 single and 9 double puddling furnaces, 5 heating furnaces, 3 steam hammers, and 5 trains of rolls (one 8, one 12, one 16, and two 18-inch); steam and water power; product, rolled charcoal and refined bar iron, bent truck sides, coupling links, and pins. A part of the establishment, entirely separate from the above plant, comprising a 10-ton hammer and a tire mill, is rented to the Standard Steel Works. H. T. Townsend, President; S. H. Pitcher, Secretary; R. F. Kennedy, Treasurer; R. H. Lee, Superintendent. *See Charcoal Furnaces. See Coke Furnaces.*

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 3 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 2 hammers; steam and water power; product, all sizes bar iron, soft wire rods, wire for flat and round head screws and for best grade of carriage bolts, and blooms for boiler plate; annual capacity bar mill, 1,800 net tons; rod mill, 1,500 net tons. *See Charcoal Furnaces. See Bloomaries.*

Milton Nail Works, C. A. Godcharles & Co., Milton, Northumberland county. Built in 1875; 4 single and 9 double puddling furnaces, 2 heating furnaces, one 20-inch train of rolls, and 75 nail machines; product, nails; annual capacity, 150,000 kegs.

Milton Rolling Mill and Axle Forge, Milton Iron Company, Milton, Northumberland county. Put in operation December 1, 1872; 6 single and 3 double puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8 and two 15-inch); product, round, square, and flat bar

iron; annual capacity, 4,000 net tons. The forge, built in New York City in 1880, and removed to Milton in 1883, contains 3 heating furnaces, 2 hammers, and all other necessary machinery for the production of car axles and iron and steel forgings. Brand, "Milton." W. A. Schreyer, President; Fred. M. Kelly, Secretary; P. C. Johnson, Treasurer; John Jenkins, Superintendent. *See Williamsport Iron and Nail Works.*

Montour Iron and Steel Works, Montour Iron and Steel Company, Danville. Built in 1845; 7 double and 27 single puddling furnaces, 20 heating furnaces, 5 trains of rolls, (three 20, one 16, and one 12-inch,) and 1 hammer; product, iron rails, bar iron, spikes, and splice bars; annual capacity, 50,000 net tons. W. E. C. Coxe, President, Reading; F. P. Howe, General Superintendent, Danville; J. T. Humphrey, Secretary; S. W. Ingersoll, Treasurer, 208 South Fourth st., Philadelphia. *See Upper Susquehanna Furnaces.*

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 9 single puddling furnaces, 1 heating furnace, 1 train of rolls, 1 rotary squeezer, and 37 nail machines, having Coyne's patent automatic nail assorters and Morrison's spike rejecter attached; 3 nail machines in course of construction; product, nails, nail plate, muck and scrap bars; annual capacity, 6,000 net tons muck bar, 5,000 tons nail plate, and 86,000 kegs of nails. Foundry and machine shop in connection.

Paxton Rolling Mills, McCormick estate, Harrisburg. Built in 1869; 7 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, and 1 hammer; product, boiler, skelp, and tank iron; annual capacity, 10,000 net tons. John Q. Denney, Superintendent.

Penn Iron Company Limited, Lancaster, Lancaster county. First put in operation in April, 1873; 6 single and 3 double puddling furnaces, 6 heating furnaces, and 4 trains of rolls (one 18-inch puddle, one 16-inch bar, one 9-inch guide, and one 8-inch guide); product, merchant bar iron, hammered and rolled axles, car forgings, bridge work, fish joints, bolts, railroad, ship, and wharf spikes, bolt ends, etc.; annual capacity, 15,000 net tons. Brand, "Penn." A. J. Steinman, Chairman; C. S. Foltz, Secretary and Treasurer; W. B. Middleton, Superintendent.

Pennsylvania Bolt and Nut Company, Lebanon, Lebanon county. First put in operation in January, 1883; 1 heating furnace and one 10-inch train of rolls; product, bar iron, bolts, nuts, washers, etc.; annual capacity, 6,000 net tons. Henry S. Eckert, President; James Lord, Secretary and Treasurer; H. V. L. Meigs, Superintendent.

Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel works built in 1865-7; made their first blow in June, 1867; two 7-gross-ton and three 8-ton converters. Rolling mill built in 1867-8; blooming mill added to the rolling mill in 1875-6, and put in operation in December, 1876. Hammer mill contains 4, 6, and 12-ton ham-

mers. Open-hearth steel plant, containing two 15-gross-ton furnaces, was erected in 1875; furnaces removed in 1883, and two 30-ton furnaces erected. There are also machine shops and the necessary repair shops connected with the works. Product, steel ingots, forgings, rails of heavy sections, street rails, and railroad axles, crossings, frogs, and switches. Annual capacity, 250,000 net tons ingots. A merchant mill, erected in 1883, contains one 12 and one 20-inch train. S. M. Felton, President; E. F. Barker, Secretary and Treasurer; Luther S. Bent, Superintendent; F. W. Wood, Assistant Superintendent; S. W. Baldwin, sales agent, New York. *See Lower Susquehanna Furnaces.*

Portage Iron Company Limited, Duncansville, Blair county. Built in 1839; rebuilt in 1882-3, 15 single puddling and 4 heating furnaces, 4 trains of rolls, (one 18-inch muck, one 15-inch bar, one 10-inch hoop, and one 8-inch guide,) and 37 nail machines; product, bar, band, hoop, and angle iron; annual capacity, 6,000 net tons of finished iron. Brand, "Portage." Not operating nail department at present. Wm. M. Wheatley, President, Duncansville; J. P. Meday, Secretary, and D. A. Nesbitt, Treasurer, 58 Hudson st., New York.

Safe Harbor Rolling Mill, Phoenix Iron Company, Safe Harbor, Lancaster county. Office, 410 Walnut st., Philadelphia. Built in 1848; 1 single and 18 double puddling furnaces, 8 heating furnaces, and 2 trains of rolls; built to make rails, but has made no rails since 1861, and was entirely idle from 1865 to February, 1880; has worked over mill cinder by the DuPuy process. T. F. Patterson, General Manager. *See Phoenix Iron Works. See Schuylkill Valley Furnaces.*

Scranton Steel Company, Scranton, Lackawanna county. Built in 1881-3; Bessemer steel works contain two 4-gross-ton converters, 4 pig-melting cupolas, 3 spiegel cupolas, and 36 soaking pits; first blow made March 29, 1883, and first steel rail rolled May 4, 1883; 5 heating furnaces, and 3 trains of 32-inch rolls; product, steel rails and billets; annual capacity, 150,000 net tons of ingots. W. W. Scranton, President and Manager; Walter Scranton, Vice-President, 56 Broadway, New York; E. P. Kingsbury, Secretary and Treasurer.

Shawnee Rolling Mill, Chestnut Hill Iron Ore Company, Columbia, Lancaster county. New York office, 52 Wall st. Built in 1854; 16 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, ship and boiler plate and skelp iron; annual capacity, 15,000 net tons. Formerly called Columbia Steel and Iron Works. B. G. Clarke, President, and Charles E. Sturgis, Treasurer, New York; Jerome L. Boyer, Superintendent, Columbia. *See Lower Susquehanna Furnaces.*

Standard Nail and Iron Company, Williamsport, Lycoming county. Works at Crescent. Built in 1842; 3 single puddling furnaces, 1 heating furnace, 1 train of plate rolls and 1 train of muck-bar rolls, and 17 nail machines; product, nails and bar iron; annual capacity of nails, 25,000 kegs. Brand, "Standard." J. Corcoran, Treasurer; Bostley Brothers, Mill Superintendents.

Standard Steel Works, 220 South Fourth st., Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 11 heating furnaces, 4 hammers, (one 10-ton Tannet & Walker, one 7-ton Sellers, one 30-cwt. Morris, and one 4,000-lb. helve,) and 1 tire mill; product, steel locomotive and car tires, axles, and forgings. Specialty, locomotive and car-wheel tires. Ingots are obtained from the Otis Iron and Steel Company, and are worked here. Brand, the word "Standard" between two anchors. Wm. Burnham, Secretary and Treasurer; Wm. G. Neilson, Manager; J. P. Stevenson, Superintendent.

Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury, Northumberland county. Built in 1883, and first put in operation in August, 1883; 3 double puddling furnaces, 1 heating furnace, 2 trains of rolls, and 31 nail machines; product, nails. John Haas, President; D. Heim, Vice-President; E. Greenough, Secretary; L. T. Rohrbach, Treasurer.

Susquehanna Iron Works, Susquehanna Iron Company, Columbia, Lancaster county. Built in 1860; 12 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 8,000 net tons. M. Schall, President; Vernon Ellis, Secretary and Treasurer; John Paine, Superintendent.

Towanda Nail Works, R. A. Bostley & Co., Towanda, Bradford county. First started in November, 1872; 1 single and 4 double puddling furnaces, 1 heating furnace, 26 nail machines, and 2 trains of rolls (19-inch puddle and 19-inch plate); product, nails; annual capacity, 50,000 kegs.

Tyrone Forges, M. V. Smith & Co., Tyrone, Blair county. Established in 1809; forge rebuilt in 1870, with 12 fires; 1 double run-out and 1 hammer; 1 Siemens rotator, direct process, added in 1879-80; rolling mill plant added in 1883, with one 16-inch train of rolls, 2 double puddling furnaces, and 1 regenerative gas heating furnace; daily capacity, 30 net tons of boiler tube skelp, carriage axles, etc. *See Forges.*

West Lebanon Rolling Mill Company Limited, Lebanon, Lebanon county. Three single puddling furnaces, 2 heating furnaces, and 2 trains of rolls; product, bar and horse-shoe iron; annual capacity, 2,000 net tons. Chain works erected in 1884. T. T. Worth, President; H. M. Capp, Secretary and Treasurer; Jacob Capp, Superintendent.

Williamsport Iron and Nail Works, Milton Iron Company, Williamsport, Lycoming county. Built in 1873-4; 1 single and 5 double puddling furnaces, 1 rotary squeezer, one 6-tuyere run-out fire, 8 forge fires, 2 heating furnaces, 1 hammer, 3 trains of rolls, (one 8, one 17, and one 18-inch,) and 55 nail machines; product, bar iron, iron and steel nails, and charcoal blooms, bars, and wire rods; annual capacity, 100,000 kegs of nails and 5,000 net tons of other products. *See Milton Rolling Mill and Axle Forge.*

York Rolling Mill, Schall, Steacy & Denney, York, York county. Built in 1869; rebuilt in 1881-2; 6 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, (two 22 and one 18-inch,) and 1 hammer; product, plate and skelp iron; annual capacity, 9,000 net tons.

Number of rolling mills and steel works in Central Pennsylvania: 47 completed, and 1 building. Of these 3 are Bessemer steel works and 2 are open-hearth steel works.

PITTSBURGH AND ALLEGHENY COUNTY.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers & Phillips, Pittsburgh, Allegheny county. Lower mills situated at Wood's Run Station, Allegheny City; upper mills situated on Tenth and Fifteenth sts., South Side, Pittsburgh. Built in 1866, 1864, and 1836, respectively; 107 single puddling furnaces, 23 heating furnaces, 3 rotary squeezers, and 14 trains of rolls; product, bar iron, plate and angle iron, skelp iron, light T rails, etc., part of which is used in the production of wrought-iron hardware, consisting of bolts, nuts, washers, hinges, etc.; annual capacity, 97,500 net tons. One 2-ton Clapp & Griffiths stationary converter, for the production of Bessemer steel for rivets and wagon specialties, built in 1884; first blow made March 25, 1884. A second converter in course of erection.

American Iron and Steel Works, Jones & Laughlins Limited, Pittsburgh. Built in 1852; 76 single puddling and 3 scrap furnaces, 30 heating furnaces, 21 trains of rolls, 3 hammers, and 63 nail machines; product, bars, nails, hoops, railroad spikes, plates, sheets, cold-rolled shafting, etc.; annual capacity, 150,000 kegs of cut nails and 58,500 net tons of other products. B. F. Jones, Chairman; G. M. Laughlin, Secretary and Treasurer; T. M. Jones, General Manager.

Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. Built in 1842; 24 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, 96 nail machines, 65 tack machines, and 2 hammers; product, spikes, nails, tacks, and American and Swedish plates; annual capacity, 15,000 net tons.

Black Diamond Steel Works, Park, Brother & Co. Limited, Pittsburgh. Decline to give information.

Byers (A. M.) & Co., Pittsburgh. Built in 1862-3; 26 puddling furnaces, 6 heating furnaces, 1 scrap furnace, and 3 trains of rolls (one 16, one 18, and one 20-inch); product, bars, plates, sheets, shafting, and skelp iron; annual capacity, 15,000 net tons. Also a galvanizing department and 2 pipe mills, to make lap and butt-welded wrought-iron gas, steam, and water pipe, oil-well tubing, casing, boiler flues, etc.

Chartiers Iron and Steel Company Limited, 143 First avenue, Pittsburgh. Works at Mansfield Valley, Allegheny county. Built in 1883-4, and put in operation August 13, 1884; 4 single puddling furnaces, 8 heating furnaces, 2 forge fires, 6 trains of 22-inch rolls, and 1 hammer; product, sheet iron and sheet steel; annual capacity, 4,000 net tons. Brand, "Chartiers." John C. Kirkpatrick, Chairman; D. A. Carter, Secretary; B. C. Willson, Treasurer; John Henry, General Manager.

Clinton and Millvale Rolling Mills, Graff, Bennett & Co., Pittsburgh. Two mills: Clinton on the South Side and Millvale at Bennett Station, on W. P. R. R. Clinton was built in 1846; 7 double and 12 sin-

gle puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 41 nail machines. Millvale was built in 1850, burned December 11, 1881, and rebuilt in 1882; 10 Danks rotary puddling furnaces, 21 single, 1 double, and 1 double-double puddling furnace, 18 heating furnaces, 8 trains of rolls, and 1 hammer. Product, bars, sheets, plates, and nails; total annual capacity, 35,000 net tons. *See Fort Pitt Iron and Steel Works. See Allegheny County Furnaces.*

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. Built in 1866; 10 heating furnaces, 6 trains of rolls, 1 steel-cementing furnace, two 24-pot, two 36-pot, and one 60-pot Siemens melting furnaces, and 10 hammers; also, one forge for making iron for their own use; 180 pots can be used at each heat in steel works; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; specialty, fine steel; annual capacity, 6,000 net tons. Brand, "Crescent."

Crown Steel Works, McKeesport borough, Allegheny county. Established in 1875 by Jones, Ingold & Co.; one 24-pot Siemens steel-melting furnace, 4 heating furnaces, and 4 Bement hammers of 700, 1,000, 1,200, and 2,500 pounds weight of heads respectively; can use 24 pots at each heat in steel works. Formerly called Pitt Steel Works. Owned by the Jones estate. Recently operated by Cassidy & Co.

Eagle Rolling Mill and Tube Works, J. W. Friend & Co., Carson st., Thirty-fourth ward, South Side, Pittsburgh. Branch office, 208 Wood st., Pittsburgh. Built in 1848; 17 single puddling furnaces, 4 heating furnaces, 3 steel-heating furnaces, and 4 trains of rolls (one 20-inch muck, one 16-inch bar, one 20-inch nail plate, and one 20-inch sheet); the nail-plate train is now used for making skelp iron, and the sheet mill is used for rolling plow steel; during July, 1884, a plant for the production of tubes was built; product, muck bar, bar iron, skelp iron, and plow steel; daily capacity, double turn, 35 net tons. Brand, "Eagle."

Edgar Thomson Steel Works, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Branch office and post-office address, 48 Fifth avenue, Pittsburgh. Began operations in August, 1875; three 10-gross-ton converters; 6 cupolas, 40 x 8; 4 spiegel cupolas, 40 x 2; two 12-ton cupola ladles; 5 No. 7 Baker blowers, 3 blowing engines of Mackintosh, Hemphill & Co. type, and 1 Reynolds-Corliss blowing engine, with steam cylinders, 36 x 54 inches, and blowing cylinders, 54 x 54 inches; 1 steam and 2 hydraulic hoists; 20 tubular boilers, 15 x 5, 16 flue boilers, 30 feet x 50 inches, and 12 steel flue boilers, 28 feet x 54 inches; 32 gas producers; 11 Siemens heating furnaces; two 3-high blooming mills (one 32 and one 36-inch); 2 shears and one 3-ton hammer for shearing and clipping blooms; one 23-inch 3-high rail train; forge, containing one 6-ton hammer and 2 heating furnaces, and machine and smith shops attached; natural gas exclusively used for firing boilers and in heating furnaces; product, only Bessemer steel in the several forms of rails, blooms, and billets; daily capacity, double turn, 750 gross tons ingots, and 650 gross tons rails and billets. First

blow made August 25, 1875, and first rail rolled September 1, 1875. Brand, "Edgar Thomson Steel." Use the best quality of Bessemer pig iron, containing not over 0.1 per cent. of phosphorus. Thomas M. Carnegie, Chairman; David A. Stewart, Secretary and Treasurer; Wm. R. Jones, General Superintendent. *See Union Iron Mills. See Furnaces.*

Elba Iron and Bolt Company Limited, Lewis Block, Pittsburgh. Works at Elba Station, Baltimore and Ohio Railroad. Built in 1862; 29 single puddling furnaces, 7 heating furnaces, and 4 trains of rolls (one 8, one 10, one 18-inch, and one muck train); product, bolts, nuts, washers, merchant bar, railroad supplies, skelp iron, small forgings, etc.; annual capacity, 25,000 net tons. Formerly called Pittsburgh Bolt Works. Charles Donnelly, Chairman; T. B. Everson, General Manager.

Etna Iron Works, Spang, Chalfant & Co., Pittsburgh. Works at Etna, Allegheny county. Built in 1828; 1 double and 27 single puddling furnaces, 9 heating furnaces, 19 nail machines, and 5 trains of rolls (one 8, one 12, two 16, and one 18-inch); product, sheets, plates, rods, angles, nails, bars, and tubing; annual capacity, 14,000 net tons. Natural gas has been used in these works for the past nine years for heating and puddling iron.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Open-hearth steel works built in 1882; two 7-gross-ton Siemens open-hearth furnaces; product, steel castings. James Hemphill, Chairman; W. S. Mackintosh, Treasurer; W. Wade, Secretary.

Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. Built in 1862; 22 puddling furnaces, 18 heating furnaces, 7 hammers, two 30-pot Siemens steel-melting furnaces, and 8 trains of rolls (two 22, two 16, one 12, one 9, and two 8-inch); 60 pots can be used at each heat in steel works; product, plates, sheets, guide iron, bar iron, light T rails, and German and cast steel; annual capacity, 12,000 net tons merchant iron, 4,000 tons tool steel, and 6,000 tons special steel. *See Clinton and Millvale Rolling Mills. See Allegheny County Furnaces.*

Glendon Rolling Mill, Dilworth, Porter & Co. Limited, Pittsburgh. Built in 1857; 20 heating furnaces, 15 railroad spike machines, and 5 trains of rolls, (two 8, one 10, and two 16-inch,) two trains being "continuous" trains for spike iron; product, railroad and marine spikes; annual capacity, 30,000 net tons. Brand, "Dilworth, Porter & Co." Joseph Dilworth, President; Samuel T. Owens, Secretary; C. R. Dilworth, Treasurer.

Glenwood Steel Works, Leishman, Gordon & Snyder, Pittsburgh. Works at Glenwood Station, on B. & O. R. R. One 5-gross-ton Siemens open-hearth steel furnace, built by the Blair Iron and Steel Company in 1879; product, steel ingots.

Hussey, Binns & Co. Limited, Pittsburgh. Steel plant built in 1875; one 24-pot Siemens furnace, 3 sets of rolls, 14 heating furnaces, 1 steam hammer, 3 helve hammers, and numerous machines used in shovel-making; product, crucible cast steel, used by the firm in making

shovels, spades, and scoops. E. A. Barnes, Chairman and General Manager; George V. Willson, Secretary and Treasurer.

Hussey, Howe & Co. Limited, Penn avenue and Seventeenth st., Pittsburgh. Built in 1859; 14 single puddling furnaces, 47 heating furnaces, 15 hammers, six 24-pot and two 30-pot Siemens furnaces, and 11 trains of rolls (one 6, one 9, one 12, five 16, two 18, and one 28-inch); 204 pots can be used at each heat in steel works; product, crucible cast steel in bars, sheets, rods, plates, and special forgings; annual capacity, 11,000 net tons ingots. Open-hearth steel department contains one 7-gross-ton Siemens open-hearth steel furnace, built in 1879; product, spring, plow, and machinery steel, and boiler plates; annual capacity, 2,000 net tons of boiler plates, 1,500 tons of machinery steel, 500 tons of spring steel, and 430 tons of plow steel. Curtis G. Hussey, Chairman; James W. Brown, Secretary and Treasurer; John J. Young, General Manager. Branch warehouses, 3 Cliff st., New York; 127 Oliver st., Boston; 210 Lake st., Chicago.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Established in 1824; two 12-gross-ton Siemens-Martin open-hearth steel furnaces, annual capacity, 12,000 net tons, one built in 1879, and one built in 1881; 29 single puddling furnaces, 14 heating furnaces, 4 annealing furnaces, 4 furnaces for heating nail plates, 1 furnace for annealing nails, 9 hammers, 9 trains of rolls, (2 muck trains, one 16-inch bar, one 8-inch bar, 2 sheet trains, 1 large plate train, 1 nail-plate train, and 1 blooming-mill train,) 92 nail machines, and 4 horse-shoe machines; product, nails, sheet iron, steel boiler plate, sheet steel, plate steel, fire-box steel, horse and mule shoes, horse-shoe bar, and steel blooms; annual capacity, 26,000 net tons. Brand of nails and horse and mule shoes, "Juniata;" horse-shoe bar, "Shoenberger;" sheet and plate iron, 3 grades, "Penn," "Charcoal," and "Juniata."

Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Built in 1828; 20 single puddling and scrapping furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar, sheet, and plate iron, flat rails, and 12 to 30-lb. T rails; annual capacity, single turn, 6,000 net tons.

Keystone Rolling Mill, Keystone Rolling Mill Company Limited, Pittsburgh. Built in 1865; 30 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, merchant bar and skelp iron, plates, sheets, and boiler iron; annual capacity, 12,000 net tons.

La Belle Steel Works, Smith, Sutton & Co., Pittsburgh. Built in 1863; two 25-ton and two 30-ton converting furnaces, 1 single and 2 double puddling furnaces, 22 forge fires, 21 heating furnaces, one 36-pot and two 42-pot Siemens gas furnaces, 11 hammers, and 4 trains of rolls (one 20, one 16, one 10, and one 9-inch); 120 pots can be used at each heat in steel works; product, merchant steels of every description; also, rake teeth for sulky rakes, springs, and iron and steel axles; annual capacity, 10,000 net tons. Selling agents, Wetherell Brothers, 31 Oliver st., Boston, and James C. Hand & Co., 614 and 616 Market st., Philadelphia.

Liggett Spring and Axle Company Limited, Pittsburgh. Works at Spruce

- and Market sts., Allegheny City. Built in 1865 and 1882; one 30-ton converting furnace, 5 double and 3 single heating furnaces, one 16-inch train of rolls, and 11 hammers; make German steel, which is used in spring works; product, buggy and wagon springs and axles; annual capacity of finished goods, 2,500 net tons. N. P. H. Hugus, Chairman.
- Linden Steel Company Limited, Lewis Building, Pittsburgh. Works at Linden Station, on B. & O. R. R. Open-hearth steel works built in 1879, containing one 10-gross-ton and one 7-gross-ton Siemens open-hearth steel furnace, 1 blooming mill, one plate mill, one 18-inch sheet train, and one 10-inch train, and 3 hammers; product, open-hearth steel ingots, blooms, billets, and slabs; also, bands, squares, and flats, plates and sheets, and spring, tire, and agricultural steel; unusual shapes a specialty; daily capacity, double turn, 75 net tons. W. J. Lewis, Chairman; Henry Lloyd, Vice-President; Cephas Taylor, Secretary; M. D. W. Loomis, Treasurer; John J. Thomas, Manager.
- McKeesport Iron Works, W. D. Wood & Co., 111 Water st., Pittsburgh. Works at McKeesport, Allegheny county. Built in 1851; 12 forge fires, 12 double puddling furnaces, 22 heating furnaces, 8 trains of rolls, and 7 hammers; product, sheet iron, both common and planished; specialty, planished sheet iron; annual capacity, 8,000 net tons. Trade-mark, a Russian bear in the talons of an American eagle.
- National Tube Works Company, McKeesport, Allegheny county. Three mills: National Rolling Mill No. 1 was built in 1879; 15 Siemens double puddling furnaces, 8 heating furnaces, 2 sets of 3-high muck rolls, 1 plate mill, and 1 "continuous" mill. National Rolling Mill No. 2 was built in 1882; 18 single puddling furnaces, 1 heating furnace, 1 set of slab rolls, and 2 8-ton steam hammers. Product of the above mills, boiler tube and pipe iron and boiler plate; annual capacity, 45,000 net tons. Brand, "National." National Forge and Iron Works were built in 1881; 12 forge fires, 1 run-out fire, 1 steam hammer, 1 heating furnace, and 1 set of slab rolls; product, blooms and billets for boiler tubes and boiler plate iron; annual capacity, 8,000 net tons. James C. Converse, President; P. W. French, Secretary; Wm. S. Eaton, Treasurer; J. H. Flagler, General Manager; E. C. Converse, Assistant General Manager.
- Nellis's Agricultural Works, A. J. Nellis Company, Pittsburgh. Built in 1870; 6 forge fires, 9 heating furnaces, 6 hammers, and five 4-pot steel-melting holes; 20 pots can be used at each heat in steel works; the spring department contains a Nellis tempering and annealing furnace; product, all kinds of steel and iron for agricultural purposes, tool-steel castings especially adapted to plow shares and plow purposes, etc.
- Oliver and Roberts Wire Company Limited, Pittsburgh. Built in 1884, and first put in operation June 12, 1884; 2 heating furnaces and 4 trains of rolls (two 9, one 12, and one 18-inch); natural gas used as fuel; product, wire rods. Henry W. Oliver, Jr., Chairman; George T. Oliver, Vice-Chairman; Wm. H. Cassidy, Secretary and Treasurer; Henry Roberts, General Manager.

Pennsylvania Iron Works, Everson, Brown & Co., Pittsburgh. Built in 1844; 14 puddling furnaces, 8 heating furnaces, and 6 trains of rolls (3 sheet, 1 bar, 1 guide, and 1 muck train); product, bars and sheets; annual capacity, 6,000 net tons of sheet iron and 5,000 net tons of bar iron.

Pittsburgh Bessemer Steel Company Limited, 48 Fifth avenue, Pittsburgh. Works at Munhall Station, P. V. & C. R. R. Built in 1880-1; two 4-gross-ton converters; first blow made March 19, 1881, and first steel rail rolled August 9, 1881; one 30-inch blooming mill, one 23-inch rail train with billet train attached, and one 30-inch train for structural shapes; 2 Hainsworth patent soaking pits; product, Bessemer steel blooms, billets, rails, and structural shapes; annual capacity, 125,000 net tons of ingots. First blow made March 19, 1881. W. H. Singer, Chairman; H. P. Smith, Secretary and Treasurer.

Pittsburgh Forge and Iron Company, Tenth st. near Penn avenue, Pittsburgh. Built in 1864; 34 single puddling furnaces, 15 heating furnaces, 4 trains of rolls, (one 9, one 16, and two 20-inch,) and 6 hammers; product, bar, rod, band, oval and half oval iron, fish-plates, track bolts, and hammered car and locomotive axles; total annual capacity, 29,000 net tons. Brands, "P. F. & I." and "Special." Calvin Wells, President and Treasurer; James K. Verner, Secretary.

Pittsburgh Iron Works, J. Painter & Sons, Pittsburgh. Built in 1833; 67 single puddling furnaces, 15 heating furnaces, and 13 trains of rolls (six 8-inch, three 10, one 12, one 16, and two 20-inch); product, principally oil, whisky, and trunk hoops; also, hoops for pails, tubs, and wooden ware, cotton ties, lock iron, stone saws, merchant bands, and hinge iron; annual capacity, 33,000 net tons. Brand, "Painter."

Pittsburgh Steel Casting Company, Twenty-sixth and Railroad sts., Pittsburgh. Built in 1871; two 24-pot Siemens furnaces, one 24-pot coke furnace, and 7 annealing furnaces; 72 pots can be used at each heat in steel works; product, steel castings; annual capacity, 4,000 net tons. One 5-ton Bessemer steel converter, built in 1881; first blow made August 26, 1881; 1 equalizing pit, 1 heating furnace, and 1 "universal" mill; product, steel castings and billets; annual capacity, 40,000 net tons. W. G. Johnston, President; Charles I. Travelli, Vice-President; F. N. Hoffstot, Secretary; John Irwin, Jr., Treasurer; Wm. Hainsworth, Superintendent.

Pittsburgh Steel Works, 107 Wood st., Pittsburgh. Works at Chartiers, Allegheny county, on the Pittsburgh and Lake Erie Railroad. Built in 1882-3, and first crucible steel made April 11, 1883; 12 heating furnaces, 12 trains of rolls, (one 16-inch bar, one 16-inch sheet, one 16-inch roughing, one 20-inch roughing, one 3-high 16-inch sheet, one 3-high bar, two 3-high 10-inch guide, two 3-high 12-inch guide, and two 3-high 20-inch plate trains,) and 3 hammers; two 33-pot and four 16-pot Siemens steel melting furnaces; 130 pots can be used at each heat in steel works; product, plow, plate, sheet, best edge tool, agricultural, and other grades of crucible steel; annual capacity, 10,000 net tons.

David Shaw, Superintendent. Selling agents, M. T. Miles & Son, Chicago, and D. H. Kent & Co. Limited, Philadelphia.

Republic Iron Works Limited, Water and Smithfield sts., Pittsburgh. Built in 1863; 20 single puddling furnaces, 11 heating furnaces, 10 forge fires, and 5 trains of rolls (one 10, one 16, two 20, and one 24-inch); product, boiler tube and pipe iron and black and galvanized sheet iron; annual capacity, 20,000 net tons of boiler tube and pipe iron and 6,000 net tons of sheet iron. Brand, "Republic." An extensive galvanizing department is connected with the works. E. C. Converse, Chairman; Horace Crosby, Treasurer and General Manager.

Sable Iron and Nail Works, Zug & Co., Pittsburgh. Built in 1845; 34 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 59 nail machines; product, merchant bar iron, including heavy sizes of flat bars and squares made by the "universal" rolls, and nails; annual capacity, 18,000 net tons. Brand, "Sable."

Singer, Nimick & Co. Limited, Pittsburgh. Built in 1848; 8 puddling furnaces, 8 converting furnaces, 12 steam hammers, one train of muck rolls, 4 trains of bar rolls, 5 trains of sheet rolls, and one 10-gross-ton Siemens open-hearth steel furnace; 258 pots can be used at each heat in steel works; annual ingot capacity, 23,000 net tons; product, tool, saw, boiler, and agricultural steel; also, carriage springs and axles. W. H. Singer, Chairman; George Singer, Jr., Secretary and Treasurer. General agents for the Eastern States, Hogan & Burrows, 283 Pearl st., New York.

Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 34 single puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (12, 16, 18, 24, and 30-inch); product, bars, angles, sheets and plates, and light T rails; boiler plates a specialty; make "Sligo" bars and "Tyrone" refined iron; boiler heads and flue holes flanged to order; annual capacity, 16,000 net tons.

Soho Iron Mills, Moorhead & Co., Pittsburgh. Built in 1859; 8 forge fires, 21 single puddling furnaces, 8 heating furnaces, 2 sheet furnaces, 4 pair furnaces, 5 annealing furnaces, one 6-tuyere refinery, 8 trains of rolls, (2 muck and 6 sheet trains,) and 2 hammers; product, "C. H. B." galvanized iron, Juniata, charcoal, and common sheet and plate iron; annual capacity, 13,000 net tons. Open-hearth steel department contains one 12-ton open-hearth steel furnace; first steel made November 29, 1883; product, steel plate; annual capacity, 7,200 net tons.

Solar Iron Works, Wm. Clark & Co., Pittsburgh. Built in 1869; 21 single puddling furnaces, 6 heating furnaces, and 6 trains of rolls (one 7-inch hoop, two 8-inch hoop, one 9-inch, one 12-inch bar, and one 18-inch muck); product, hoop, band, box and scroll iron, and cotton ties; annual capacity, 12,000 net tons. Brands, "Solar" and "Clark."

Spang Steel and Iron Company Limited, Pittsburgh. Office, 66, 68, and 70 Sandusky st., Allegheny City. Post-office address, Pittsburgh. Built in 1880-1; one 7-gross-ton Siemens-Martin open-hearth steel furnace completed and one 10-gross-ton Siemens-Martin furnace build-

ing, to take the place of one 7-gross-ton Pernot furnace torn down in September, 1884; 4 trains of rolls (one 30-inch bloom, one 30-inch "universal," one 18-inch bar, and one 112 in. x 31 in. plate train); product, open-hearth steel billets, bars, and plates; annual capacity of the completed furnace, 6,000 net tons. Hugh McNeil, Chairman; John C. Porter, Secretary and Treasurer; Robert Forsyth, Superintendent.

Star Iron Works, Lindsay & McCutcheon, Allegheny City, Allegheny county. Built in 1862; 37 single puddling furnaces, 10 heating furnaces, and 8 trains of rolls (three 8, one 10, one 12, and one 18-inch, and two muck trains); product, cotton ties, hoop, band, skelp, and horse-shoe iron; annual capacity, 12,000 net tons. Brand, "Star."

Superior Rolling Mill, Manchester Iron and Steel Company, Henry Stanton, Assignee, 32 and 34 Nassau st., New York. Works at Pittsburgh. Built in 1865; 32 single puddling furnaces, 16 heating furnaces, and 4 trains of rolls; product, iron and steel structural material; special facilities for the manufacture of heavy steel rolled shapes and unusual shapes and sizes in both iron and steel, tees, angles, etc. Idle. *See Furnaces.*

Union Forge and Iron Mills, Wilson, Walker & Co. Limited, Twentyninth and Railroad sts., Pittsburgh. Built in 1862; 33 single puddling furnaces, 25 forge fires, 18 heating furnaces, 16 hammers, and 5 trains of rolls (one 18, one 15, and one 10-inch, and 2 "universal" plate trains); product, railroad specialties and bridge work, angles and peculiar shapes, and bar iron; annual capacity, 17,000 net tons. John T. Wilson, Chairman; W. W. Blackburn, Secretary; John Walker, Treasurer.

Union Iron Mills, Carnegie Brothers & Co. Limited, Pittsburgh. Office and mills, Thirty-third st. Built in 1862; 38 single puddling furnaces, 8 double and 4 single Siemens heating furnaces, 1 single reverberatory heating furnace, and 8 trains of rolls; product, iron and steel beams, channels, tees, angles, plates, and bars; use natural gas for fuel; annual capacity, 45,000 net tons. Superintendent of mills, H. W. Borntraeger. *See Edgar Thomson Steel Works. See Furnaces.*

United States Iron and Tin Plate Works, United States Iron and Tin Plate Company Limited, Demmler Station, McKeesport, Allegheny county. Branch office, 626 Liberty st., Pittsburgh. Built in 1873-4; burned and rebuilt in 1883; 5 puddling and 2 heating furnaces, 4 knobbling fires, 2 double sheet-mill furnaces, 3 annealing furnaces, 4 tinning stacks, (not in operation at present,) 1 hammer, 1 train of bar rolls, 2 trains of sheet rolls, and 3 sets of cold rolls; product, specialties in refined and charcoal polished black plates and Bessemer steel plates; annual capacity for black plates and tin plates, 3,300 net tons. Black plates branded "U. S. A. M." W. C. Cronemeyer, Chairman; F. E. Schenck, Treasurer. Eastern agents, Ely & Williams, Philadelphia and New York.

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh.

Office, 64, 66, and 68 Anderson st., Allegheny City. Post-office address, Pittsburgh. Works at Sharpsburgh, Allegheny county. Built in 1846; 28 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 50 nail machines; product, bar, skelp, sheet, and plate iron, and nails; annual capacity, 105,000 kegs of nails and 12,000 net tons of rolled products. Brand, "Vesuvius."

Vulcan Forge and Iron Works, Long & Co., Pittsburgh. Works at Chartiers Station, on the Pittsburgh and Lake Erie Railroad. Forge built in 1877; rolling mill built in 1882; 16 single puddling furnaces, 5 forge fires, 7 heating furnaces, 3 trains of rolls, (one 9, one 15, and one 18-inch,) and 4 hammers; product, bar iron, bridge work, and iron and steel forgings, including axles; annual capacity, 9,000 net tons of finished rolled iron and 3,500 net tons of forgings. Brands, "Vulcan," "V. F. & I.," and "L. & Co."

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1829; 28 puddling furnaces, 10 heating furnaces, 5 trains of rolls, 5 steam hammers, four 48-pot steel-melting furnaces, and one 45-ton converting furnace; 192 pots can be used at each heat in steel works. Product: Iron—bars, rods, sheets, light T rails, splice bars, and boiler plate; steel—agricultural steels of all kinds and cast tool steel. Annual capacity, 15,000 net tons of iron and 7,000 net tons of crucible steel. Brands, "Wayne" and "U. S."

Number of rolling mills and steel works in Pittsburgh and Allegheny county: 55. Of these 12 are crucible steel works, 1 makes cemented steel only, 4 produce Bessemer steel, and 9 are open-hearth steel works.

WESTERN PENNSYLVANIA, EXCEPT ALLEGHENY COUNTY.

Apollo Iron Works, Volta Iron Company Limited, Apollo, Armstrong county. General offices, Twelfth and Pike sts., Pittsburgh. Built in 1850; rebuilt in 1882; 6 puddling furnaces, 12 knobbling fires, 4 blooming furnaces, 4 bar furnaces, 4 heating furnaces, 4 annealing furnaces, 1 hammer, 2 sets of bar rolls, 2 pairs of cold rolls, and 8 pairs of sheet rolls; product, fine black and galvanized sheet iron; annual capacity, 8,000 net tons. Specialties, pan, elbow, lock, shovel, show card, etc. Brand, "Apollo." The Volta Galvanizing Works, at Pittsburgh, are owned by the same company. John Evans, Chairman; Jas. M. Bingham, Secretary and Treasurer; Managers: P. H. Laufman, J. J. Vandergrift, Jr., Chas. W. Batchelor, Jas. M. Bingham, John Evans.

Beaver Falls Rolling Mill, McKee, Anderson & Co. Limited, 603 Wood st., Pittsburgh. Works at Beaver Falls, Beaver county. Built in 1879; 12 single puddling furnaces, 4 heating furnaces, 1 annealing furnace, 4 trains of rolls, (14 and 22-inch,) and one double-acting 5,000-lb. steam hammer; product, sheet iron, refined blooms, bars, and billets for steel-making; annual capacity, 10,000 net tons. Brand, "Beaver Falls." J. D. Anderson, Chairman; J. R. McKee, Treasurer; T. H. Boyd, Secretary; Wm. Rogers, formerly of Leechburg, Manager.

Beaver Falls Steel Works, Beaver Falls, Beaver county. Built in 1875; 1 24-pot Siemens steel furnace, 1 Siemens heating furnace, 3 other heating furnaces, 2 converting furnaces, 3 steam hammers, 4 forge fires, and 2 trains of rolls (one 16 and one 9-inch); 24 pots can be used at each heat in steel works; steam and water power; product, plow, spring, cutlery, file, and tool steel; annual capacity, 1,600 net tons. Brand, "Beaver." Works were destroyed by fire on August 29, 1881, but were immediately rebuilt. James M. May, Treasurer and Superintendent.

Burgess, Garrett & Co., Titusville, Crawford county. Built in 1879; rebuilt in 1884; 4 single puddling furnaces, 1 heating furnace, one 16-inch train of rolls, and 3 hammers; crucible steel department contains six 2-pot steel melting holes; 12 pots can be used at each heat; product, blooms for boiler plate, sheet iron, special tool steel, and a self-hardening steel.

Cambria Iron and Steel Works, Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Built in 1853; 20 double puddling furnaces, 35 heating furnaces, and the following trains of rolls: 21-inch steel rail mill, 5 sets; 18-inch iron rail mill, 2 sets; 12-inch rail mill, 3 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 6 sets; 21-inch puddle mill, 5 sets; 30-inch steel billeting mill, 1 set; 42-inch steel ingot blooming mill, 1 set; and wire-rod mill, 9 sets; total, 35 sets. Bessemer steel works made their first blow July 10, 1871; two 6½-gross-ton converters. Two 12-gross-ton Siemens open-hearth steel furnaces with the Pernot improvement built in 1878-9; one Krupp washer. Product, iron and steel rails and steel wire rods; total capacity per annum, 168,000 net tons iron and steel rails and 20,000 net tons steel in other shapes. Officers in Philadelphia: E. Y. Townsend, President; Powell Stackhouse, Vice-President; Wm. S. Robinson, Secretary; John T. Killé, Treasurer; Harvey Ellis, Assistant Treasurer. Officers at Johnstown: P. E. Chapin, General Manager; S. P. S. Ellis, Assistant to General Manager; Cyrus Elder, Solicitor and General Agent; Joseph Morgan, Jr., Chief Engineer. *See Bituminous Furnaces.*

Canonsburg Iron Company Limited, Canonsburg, Washington county. Built in 1882; 2 double puddling furnaces, 4 forge fires, 9 heating furnaces, 7 trains of rolls; product, fine sheet iron, stamping iron, and sheet steel; annual capacity, 3,000 net tons. John Ewing, Chairman; Louis A. Meyran, Secretary and Treasurer; H. S. Duncan, Superintendent.

Erie Rolling Mill, Mount Hickory Iron Company Limited, Erie, Erie county. Built in 1872; 15 single and 2 double puddling furnaces, 4 heating furnaces, and 4 trains of rolls (one 8, one 10, one 15, and one 20-inch). Mill destroyed by fire December 9, 1883. Plans for rebuilding on a much larger scale now being made. Charles H. Strong, Chairman; Wm. S. Brown, Secretary and Treasurer. *See Shenango Valley Furnaces.*

Etna Iron Works Limited, New Castle, Lawrence county. Consolidated November 1, 1874, from Etna Iron Company and Onondaga Iron and Nail Company; 2 double and 21 single puddling furnaces, 5 heating furnaces, 55 nail machines, and 4 trains of rolls (two 18, one 16, and one 8-inch); product, nails and merchant iron. T. W. Sweaney, Chairman; A. W. Thompson, Secretary. *See Shenango Valley Furnaces.*

Gautier Steel Department of Cambria Iron Company, (formerly Gautier Steel Company Limited,) Johnstown, Cambria county. Works erected in 1878. Rolling mill has 6 trains of rolls, (two 9, two 12, and two 20-inch,) with full equipment of furnaces, shears, hammers, and special machinery. Make merchant bar steel of every size, and for every purpose, the specialties being: Tire, spring, toe-calk, and plow steels; annual capacity, 30,000 net tons. Under same roof are separate departments, whose productions are as follows: Plow shapes and slabs, annual capacity, 6,000 net tons; finished plow steels, 3,000 tons; elliptic carriage and railroad springs, 1,500 tons; harrow teeth, 500 tons; horse-rake teeth, 100,000 sets; steel finger-bars, 125,000 bars; cold-rolled steel, 3,000 tons. The wire mill has an annual capacity of 30,000 net tons of fence wire alone. It produces all kinds of market wire, annealed, bright, coppered, tinned, and galvanized, for every purpose; also telegraph and telephone wire. Principal office, Johnstown. Branch offices, 104 Reade st., New York, N. Y.; 523 Arch st., Philadelphia, Pa.; 100 Dearborn st., Chicago, Ill.; 411 North Third st., St. Louis, Mo.; 15 East Eighth st., Chattanooga, Tenn.

Hartman Steel Company Limited, Beaver Falls, Beaver county. Built in 1883, and first put in operation September 1, 1883; 5 large heating furnaces; the merchant steel department contains 2 trains of rolls (12 and 18-inch); the rod department contains 3 trains of rolls (18, 12, and 9-inch); product, merchant steel and wire rods; annual capacity, steel department, 30,000 net tons; wire rod department, 20,000 net tons. H. W. Hartman, Chairman; L. Bullions, Treasurer.

Kimberly (P. L.) & Co., Sharon, Mercer county. Three mills in Mercer county: Atlantic Iron and Nail Works, at Sharon, built in 1867; 32 puddling furnaces, 6 heating furnaces, 6 trains of rolls, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 20,000 net tons. New Castle Iron Works, at Sharon, built in 1873; 3 double and 10 single puddling furnaces, 6 heating furnaces, 4 trains of rolls, and 1 hammer; product, light and heavy sheet iron from hammered blooms; annual capacity, 6,000 net tons. Greenville Rolling Mill, at Greenville, built in 1871; 25 single puddling furnaces, 2 heating furnaces, 1 old-rail reheating furnace, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, hoop, band, and bar iron; annual capacity, 12,000 net tons. *See Shenango Valley Furnaces.*

Kittanning Iron Company Limited, Kittanning, Armstrong county. Built in 1848; rebuilt in 1880; 33 single puddling furnaces, using natural gas, 5 heating furnaces, one 3-high 22-inch train, and 1 squeezer; product, muck bar; annual capacity, 12,000 net tons. James

- Mosgrove, Chairman; Henry A. Colwell, Secretary and Treasurer; Charles T. Neale, General Manager. *See Bituminous Furnaces.*
- Leechburg Sheet Iron and Tin Plate Works, Kirkpatrick & Co. Limited, Leechburg, Armstrong county. Office, 143 First avenue, Pittsburgh. Built in 1872; 6 single puddling furnaces, 6 knobbling fires, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, finest quality of stamping irons, and tea-tray, show-card, spoon, shovel, trunk, taggers, Juniata, and lock iron, cold-rolled sheet steel, pan and elbow iron, and tin and terne plates; annual capacity, 3,100 net tons. Use natural gas for fuel. Brand, "Leechburg." One 10-ton open-hearth steel furnace erected in 1884. John C. Kirkpatrick, Chairman; John C. Wallace, Secretary; B. C. Willson, Treasurer.
- Myers, (H. M.) & Co. Limited, Beaver Falls, Beaver county. Rolling mill built in 1883; 2 heating furnaces, 3 trains of 18-inch rolls, and 4 hammers; product, sheet steel, used by the firm in the production of shovels, spades, grain scoops, etc.
- Old Fort Iron Mills, Brownsville, Fayette county. Completed December 1, 1873; 8 puddling and 3 heating furnaces, 2 trains of rolls, and one 5-ton steam hammer; product, hammered blooms and billets and rolled sheet, bar, and guide iron; annual capacity, 6,000 net tons. Have been idle for several years.
- Scottdale Iron Works, W. H. Everson & Co., Scottdale, Westmoreland county. Branch office, Pittsburgh. Built in 1873; 8 single and 4 double puddling furnaces, 3 heating furnaces, 5 sheet furnaces, and 3 trains of rolls; product, muck bar and sheet iron; annual capacity, 8,000 net tons of muck bar and 3,000 net tons of sheet iron.
- Sharon Iron Company, C. H. Buhl, Sharon, Mercer county. Built in 1862; 35 puddling furnaces, 12 heating furnaces, 6 trains of rolls, (two 8, one 16, two 18, and one 20-inch,) and 64 nail machines; product, bar, hoop, and sheet iron, railroad and boat spikes, light T rails, and nails; annual capacity, 17,000 net tons. Brand, "Westerman." Geo. H. Taylor, Manager. *See Shenango Valley Furnaces.*
- Shenango Iron Works, estate of Wm. H. Brown, New Castle, Lawrence county. Built in 1848; 27 single puddling furnaces, 9 heating furnaces, 5 trains of rolls, and 55 nail machines; product, bars, light T rails, sheets, bands, wrought spikes, and nails; annual capacity, 15,000 net tons.
- Stewart Iron Works, Stewart Iron Company Limited, Sharon, Mercer county. Built in 1870; 15 single puddling furnaces, 2 heating furnaces, 2 hammers, and 2 trains of 3-high 18-inch rolls; product, muck bar, and blooms for steel purposes; annual capacity, 9,000 net tons. David Stewart, Chairman, 119 Broadway, New York; Theo. F. Hicks, Secretary, New York; Gardner P. Lloyd, Treasurer, New York; Fayette Brown, General Agent, and H. H. Brown, Assistant General Agent, Cleveland; Samuel McClure, Agent, Sharon, Pa. *See Shenango Valley Furnaces.*
- West Penn Steel Works, Joseph G. Beale, Leechburg, Armstrong coun-

ty. Built in 1881; one 7-gross-ton Siemens open-hearth steel furnace, 1 heating furnace, and 1 hammer; fuel, natural gas almost entirely; product, very low carbon steel, for fine sheets and wire; annual capacity, 5,000 net tons. Pittsburgh office, 106 Fourth avenue.

Wheatland Rolling Mills, Wheatland Bessemer Steel Company, Wheatland, Mercer county. Built in 1872; 12 double puddling furnaces, 14 heating furnaces, and 3 trains of rolls; started in November, 1881, after an idleness of 7 years. These works are the property of the estate of James Wood. Have been idle for some time. *See Shenango Valley Furnaces.*

Wheeler Iron Company, Sharon. Rolling mill at West Middlesex, Mercer county. Put in operation June 1, 1873; 18 single puddling furnaces, 2 heating furnaces, 2 trains of rolls, (one 10 and one 18-inch,) and 1 hammer; product, muck bar, blooms, and bar iron, made from Bessemer pig iron, and sold principally to steel manufacturers; chain links, all sizes, ready for welding, a specialty; annual capacity, 9,000 net tons. Chain works, containing 50 forges for the welding of chains, were added in 1883. E. A. Wheeler, Manager. *See Shenango Valley Furnaces.*

Number of rolling mills and steel works in Western Pennsylvania except Pittsburgh and Allegheny county: 23 completed. Of these 2 make crucible steel, 3 make open-hearth steel, and 1 makes Bessemer steel.

Total number of rolling mills and steel works in Pennsylvania: 190 completed, and 2 building. Of these 20 make crucible steel; 17 make open-hearth steel, and 2 open-hearth steel works are building; 9 make Bessemer steel; 1 makes cemented steel only, and 2 make steel castings solely.

DELAWARE.

Christiana Iron Works, Christiana Iron Company, Wilmington, New Castle county. Built in 1873-4; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 2 hammers; product, steel boiler plates.

Delaware Iron Works, Alan Wood & Co., Wooddale, New Castle county, near Wilmington. Office, 519 Arch st., Philadelphia. Built in 1812; 1 grate and annealing furnace and one 20-inch train of rolls; water-power; bars made at Conshohocken, Pa., for these works; product, sheet iron; annual capacity, 550 net tons. *See Eastern Pennsylvania Rolling Mills.*

Diamond State Iron Company, Wilmington. New York office, Coal and Iron Exchange, 21 Cortlandt st. Two mills: Diamond State Mill, built in 1853; 1 single and 5 double puddling furnaces, 1 scrap furnace, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, and two 18-inch); product, merchant bar iron, fish-plates, railroad spikes, bolts and nuts, and bridge bolts; annual capacity, 16,000 net tons. Old Ferry Mill, built in 1868; 3 double puddling furnaces, 4 heating furnaces, one 16-inch puddle mill, one 18-inch bar mill, and one 9-inch

- bar mill; product, horse shoes, fish-plates, and all kinds of bar iron; annual capacity, 10,000 net tons. H. Mendinhall, President; Clement B. Smyth, Vice-President and Treasurer; George W. Todd, Secretary; John T. Davis, Superintendent.
- Edge Moor Iron Company, Wilmington. Philadelphia office, 1600 Hamilton st. Rolling mill first put in operation in February, 1882; additions to rolling mill plant in course of construction. Wm. Sellers, President; John Sellers, Jr., Vice-President; Eli Garrett, Secretary and Treasurer; George H. Sellers, General Superintendent.
- Marshallton Iron Works, John R. Bringhurst, Marshallton, New Castle county. Built in 1836; steam mill built in 1880; enlarged in 1884; 1 single and 2 double puddling furnaces, 3 grate heating furnaces, 1 reverberatory heating furnace, 1 annealing furnace, 3 trains of sheet rolls, and 1 train of bar rolls; steam-power drives two trains and water-power the others; product, bar and sheet iron; annual capacity, 2,200 net tons of bar iron and 2,000 net tons of sheet iron. Brands, "Star" and "Delaware."
- Minquas Iron Works, McCullough Iron Company, Wilmington. Built in 1873, and first put in operation in 1875; 6 single and 2 double puddling furnaces, 2 reverberatory heating furnaces, 3 grate heating furnaces, 1 annealing furnace, 5 trains of rolls, and 1 hammer; product, "Harvey's patent cleaned" sheet iron; annual capacity, 3,000 net tons. D. McDaniel, President; E. McCullough, Vice-President; J. L. McDaniel, Secretary; Henry Whiteley, Treasurer; Huxley Harvey, Superintendent. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue. *See Maryland Rolling Mills. See Bloomaries.*
- Newport Rolling Mills, Marshall Iron Company, Newport, New Castle county. Built in 1873; galvanizing works added in 1877; 4 single puddling furnaces, 1 reverberatory heating furnace, 2 grate furnaces, 1 annealing furnace, 1 rotary squeezer, and 3 trains of rolls; product, black sheet iron; annual capacity, 1,500 net tons. Edward Mendinhall, President; Joseph W. H. Watson, Secretary and Treasurer.
- Riverside Rolling Mill, Morris, Tasker & Co. Limited, New Castle, New Castle county. Office, 222 South Third st., Philadelphia. Mill removed from Bristol, Pa., to New Castle in 1874-5; enlarged in 1879; 4 double puddling furnaces, 3 heating furnaces, 1 train of 3-high 56-inch plate rolls, 1 train of 2-high 40-inch plate rolls, 1 train of muck rolls, and 1 hammer; product, boiler plate, tube, and skelp iron; annual capacity, 5,000 net tons.
- Wilmington Plate Iron Rolling Mills, Seidel and Hastings Company, Wilmington. First mill built in 1845; second, in 1870; another mill, for tops and bottoms only, with a train of rolls 17 in. x 48 in., was built in 1875; 5 forge fires, 4 heating furnaces, 3 trains of rolls, and 3 hammers; product, boiler, ship, and tank iron; annual capacity, 5,000 net tons.
- Number of rolling mills in Delaware: 10.

MARYLAND.

Abbott Iron Works, Abbott Iron Company, P. O. Box 185, Baltimore.

(1) Plate mills, built in 1851; 6 double puddling and 8 heating furnaces, 1 hammer, and 5 trains of rolls; 2 sets Lauth's patent 3-high rolls, with facilities for rolling plates to 100 inches in width and girder plates 40 feet in length. (2) Rail mill, built in 1865; 17 double puddling and 10 heating furnaces, 2 trains of rail rolls, 1 hammer, and 1 train of bar rolls. Product, (1) boiler, tank, boat, still, car, and bridge plates; annual capacity, 10,000 net tons. Product, (2) iron rails and bar iron; annual capacity, 25,000 net tons. Charles H. Ashburner, President; J. S. Gilman, Vice-President and Treasurer. *See Furnaces in Virginia. See Bloomaries.*

Canton Iron Works, G. W. Anderson, owner, Philadelphia, Pa. Works at Canton, Baltimore county. Built in 1878; 3 double puddling and 2 heating furnaces, and 2 trains of rolls (one 8 and one 16-inch); product, refined merchant bar iron; annual capacity, 2,500 net tons. For sale.

Crown and Cumberland Steel Company, Pittsburgh, Pa. Works at Cumberland, Alleghany county. Built in 1873-4; rebuilt and enlarged in 1884; 5 heating furnaces, 1 Siemens 24-pot melting furnace, 1 blistering furnace, 4 steam hammers, and one 9-inch and one 16-inch train of rolls; product, all kinds of rolled and hammered tool and machinery steel; annual capacity, 800 net tons. E. T. Cassidy, President; O. Bergman, Secretary and Treasurer.

Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland, Alleghany county. Main office, Mount Clare, Baltimore. Rail mill built in 1870; 15 double puddling furnaces, 16 heating furnaces, 4 trains of rolls, and 3 hammers; product, rails, axles, girders, and plates. Bar mill built in 1873; 4 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar and bridge iron, all sizes guide iron, bolts, rivets, spikes, and fish-plates. Annual capacity, 21,000 net tons of bars, angles, and tees, 2,200 tons of plates, and 4,700 tons of beams and channels. Wm. Robinson, Superintendent.

Locust Point Iron and Steel Works, Coates & Co., Baltimore. Built in 1862; 4 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; product, plate, tank, and flue iron and steel; annual capacity, 7,500 net tons.

McCullough Iron Company, Northeast, Elkton, and Rowlandville, Cecil county. Three iron works in Cecil county: Northeast Works, at Northeast; West Amwell Works, at Elkton; and Octoraro Works, at Rowlandville. The Northeast Works were originally built in 1847; 4 single puddling and 6 heating furnaces, and 5 trains of rolls; water and steam power; product, sheet iron for galvanizing, boiled iron of the kind called "Harvey's patent cleaned," and refined and best bloom bar iron; annual capacity, 3,000 net tons of sheet iron and

6,000 tons of refined and bloom bar iron. A bloomary of 18 fires is also at Northeast, owned and operated by this company. The West Amwell Works have 3 heating furnaces, 2 trains of rolls, and smaller finishing machinery; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron; annual capacity, 1,000 net tons. The Octoraro Works were originally built in 1829; 5 heating furnaces and 3 trains of rolls; water-power; supplied with stock from the Northeast Works; product, sheet iron for galvanizing and "Harvey's patent cleaned" sheet iron, branded "Octoraro;" annual capacity, 2,000 net tons. Represented in Philadelphia by the McDaniel and Harvey Company, 1600 Washington avenue: D. McDaniel, President; E. McCullough, Vice-President; Joseph L. McDaniel, Secretary; Henry Whiteley, Treasurer; George W. McCullough, Superintendent. *See Rolling Mills in Delaware. See Bloomaries.*

Number of rolling mills and steel works in Maryland: 8. Of these 1 is a crucible steel works.

DISTRICT OF COLUMBIA.

Equipment Iron Rolling Mill, (under control of Bureau of Equipment and Recruiting, United States Navy Department,) Navy Yard, Washington. Built in 1878; 7 forge fires, 2 scrap heating furnaces, 3 hammers, and 1 train of rolls; product, bar, angle, and plate iron. James Wilson, Superintendent.

Number of rolling mills in District of Columbia: 1.

VIRGINIA.

Lynchburg Iron Works, Lynchburg Iron Company, Lynchburg, Campbell county. Branch office, 235 Dock st., Philadelphia. Built in 1872; 1 heating furnace, 1 spike furnace, 1 spike machine, 1 bolt machine, and one 10-inch train of rolls; steam and water power; product, merchant bar and band iron, bolts, and nuts. Foundry, forge, machine shop, and bridge works operated in connection with the rolling mill. E. Burd Grubb, President; Alex. Van Rensselaer, Vice-President; John Heins, Treasurer. *See Furnaces.*

Old Dominion Iron and Nail Works, Richmond, Henrico county. Works on Belle Isle. Improved and enlarged since 1865; 15 double and 10 single puddling furnaces, 6 heating furnaces, 5 trains of rolls, 100 nail machines, 2 squeezers, and 1 hammer; water and steam power; product, merchant bar iron, cut nails, spikes, and horse shoes; annual capacity, 12,000 net tons nails, 11,000 tons rolled iron. Brand, "Old Dominion." R. E. Blankenship, Commercial Agent.

Tredegear Iron Works, Tredegear Company, Richmond. Built in 1837; 1 double and 23 single puddling furnaces, 16 heating furnaces, including one Siemens heating furnace, and 7 trains of rolls; water-power; product, merchant bar iron, railroad axles, bridge iron, fish-plates, spikes,

chairs, track bolts, and horse shoes; annual capacity, 38,000 net tons. Foundry and machine shops, run by water-power, contain 3 air furnaces and 6 cupolas, have melting capacity of 150 tons per day, and make car-wheels, pipes, and machinery. Car shops, run by both water and steam power, can turn out 200 freight cars per month. Joseph R. Anderson, President; Archer Anderson, Treasurer; R. S. Archer, Superintendent rolling mills; F. T. Glasgow, Superintendent foundry and machine and car shops; J. F. T. Anderson, Jr., Secretary. *See Furnaces.*

Virginia Iron Ship Building Company, Alexandria, Alexandria county. Building a rolling mill for the manufacture of iron for ships. The company is composed of New England capitalists. G. C. Goss, President, Bath, Maine; E. D. Emerson, Treasurer, Waltham, Mass.

Virginia Nail and Iron Works, Virginia Nail and Iron Works Company, Lynchburg, Campbell county. Mill situated $4\frac{1}{2}$ miles above Lynchburg, on the Richmond and Alleghany Railroad. Built in 1867 and refitted in 1880; nail factory added in 1884; 4 double puddling and 7 heating furnaces, 2 spike machines, 25 nail machines, and 3 trains of rolls (two 20-inch and one 10-inch); water-power; product, round, square, and flat bar iron, light rails, nails, and spikes; annual capacity, 60,000 kegs of nails and 4,500 net tons of bar and guide iron. I. H. Adams, President; J. P. Williams, Secretary, Treasurer, and Commercial Agent; T. C. Jones, General Manager.

Number of rolling mills in Virginia: 4 completed, and 1 building.

ALABAMA.

Anniston Rolling Mill, Noble Brothers & Co., Anniston, Calhoun county. Built in 1884; 2 double puddling furnaces, 4 heating furnaces, 6 trains of 22-inch rolls, and 3 hammers; product, railroad car-axes; annual capacity, 3,000 net tons.

Birmingham Rolling Mill, Birmingham Rolling Mill Company, Birmingham, Jefferson county. Main office, Louisville, Ky. Completed in July, 1880; 10 double and 3 single puddling furnaces, 7 annealing furnaces, 2 pair furnaces, and 5 trains of rolls (one 24, one 18, one 16, and two 8-inch); product, bar, sheet, and plate iron, small T rails, tram rails, and fish-plates; car iron a specialty; annual capacity, 30,000 net tons. James G. Caldwell, President; B. Du Pont, Secretary; Thomas Ward, General Manager; J. D. Dwyer, Superintendent.

Brierfield Rolling Mill, Brierfield Coal and Iron Company, Brierfield, Bibb county. Built in 1863, rebuilt in 1882-3, and put in operation in August, 1883; 1 double and 12 single puddling furnaces, 5 heating furnaces, 3 18-inch trains of rolls, and 72 nail machines; product, nails; annual capacity, 125,000 kegs. The works also contain a 9-inch merchant train of rolls, but it has never been used. T. J. Peter, President; John G. Murray, Secretary and Auditor; M. A. Williams, Superintendent. *See Furnaces.*

Central Iron Works, Helena, Shelby county. Put in operation in March, 1873; 4 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 10 nail machines; product, merchant bar iron and nails; annual capacity, 1,000 net tons. Rufus W. Cobb, President; Burwell B. Lewis, Vice-President; Richard Fell, Jr., Secretary and Treasurer.

Number of rolling mills in Alabama: 4.

TEXAS.

Houston Rolling Mills, Houston Rolling Mills and Iron Company, Houston, Harris county. Built in 1884, and put in operation in May, 1884; 3 heating furnaces, 2 spike machines, and one 9 and one 16-inch train of rolls; product, light T rails, merchant bar iron, railroad spikes, fish-plates, and general railroad supplies; annual capacity, 5,000 net tons. A. Groesbeeck, President; Wm. J. Faux, Secretary and Treasurer; Wm. Faux, General Manager and Superintendent.

Number of rolling mills in Texas: 1.

WEST VIRGINIA.

Andrew Kloman Steel and Iron Company, Moundsville, Marshall county. Branch office and post-office address, Pittsburgh, Pa. Put in operation March 1, 1874; 12 single puddling furnaces, 4 heating furnaces, 1 scrap furnace, 3 trains of rolls, (one 8, one 16, and one 19-inch,) and 3 Kloman railroad spike machines; product, merchant bar of all sizes and railroad spikes; annual capacity, 8,000 net tons of spikes. Proprietors, W. H. Carruthers, A. C. Kloman, and C. H. Kloman. This mill was formerly owned and operated by the Ohio Valley Iron Company. Idle.

Belmont Nail Company, Wheeling, Ohio county. Built in 1849; 25 single puddling furnaces, 4 heating furnaces, 4 forge fires, 3 trains of rolls, 151 nail machines, and 1 squeezer; product, nails exclusively, made from No. 1 mill iron, strictly red-short; annual capacity, 350,000 kegs. A. Wilson Kelly, President; J. D. DuBois, Secretary and Treasurer; N. Riester, Superintendent. *See Furnaces.*

Benwood Iron Works, Wheeling. Works at Benwood, Marshall county. Built in 1852; destroyed by fire in April, 1876, and rebuilt in 1876-7; 30 single puddling furnaces, 5 heating furnaces, 2 trains of rolls, and 124 nail machines; product, nails exclusively; annual capacity, 308,000 kegs. Building two 4-ton converters for the production of Bessemer steel. A. W. Campbell, President; L. S. Delaplain, Vice-President; Alonzo Loring, Secretary; George Wise, Assistant Secretary. *See Miscellaneous Bituminous Furnaces in Ohio.*

Crescent Iron Works, Whitaker Iron Company, Wheeling. Built in 1855; 15 double boiling furnaces, 3 heating furnaces, and 9 trains of rolls (pairs including bar and muck); product, sheet iron exclusively; annual capacity, 9,000 net tons. George P. Whitaker, President, Principio, Md.; N. E. Whitaker, Secretary, Wheeling.

La Belle Iron Works, Wheeling. Built in 1852; incorporated December 3, 1875, enlarged since; 23 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 122 nail machines; product, cut nails and spikes exclusively; annual capacity, 275,000 kegs. H. M. Priest, President; C. A. Robinson, Secretary; Wm. Lynch, Superintendent forge; C. C. Evans, Superintendent nail factory; W. H. Harden, Salesman.

Riverside Iron Works, Wheeling. Built in 1859, enlarged since; 42 single puddling furnaces, 9 heating furnaces, 144 nail machines, and 5 trains of rolls (one 9, one 12, two 20, and one 21-inch); product, bar iron, light T rails, railroad spikes, and steel nails exclusively; annual capacity, 9,000 net tons of finished iron and 350,000 kegs of nails. Bessemer steel works built in 1883-4; two 5-gross-ton converters; first blow made July 11, 1884; product, steel, used for nails. Brand, "Riverside." J. N. Vance, President; John D. Culbertson, Secretary and Treasurer; Frank J. Hearne, General Manager. *See Furnaces.*

Standard Nail Works, Standard Nail and Iron Company, Clifton, Mason county. Built in 1867; 22 single puddling furnaces, 4 heating furnaces, 1 annealing and 1 blueing furnace, 3 tending furnaces, 2 trains of rolls, (one 18 and one 20-inch,) and 126 nail machines; product, iron and steel nails; annual capacity, 350,000 kegs. Formerly called Clifton Nail Works. Brand, "Standard." Charles H. Green, President; Lewis W. Richards, Secretary; Wm. S. Green, Treasurer and Sales Agent, Pickering Building, Cincinnati; Lemuel Swift, Superintendent.

Top Mill, Wheeling Iron and Nail Company, Wheeling. Built in 1867, and rebuilt in 1872; 26 single puddling furnaces, 4 heating furnaces, 130 nail machines, double muck train, and 1 nail-plate train of rolls; product, cut iron nails and spikes; annual capacity, 300,000 kegs. Brand, "Top Mill." C. R. Hubbard, President; H. H. Hornbrook, Vice-President; C. D. Hubbard, Secretary and Treasurer. *See Furnaces.*

Number of rolling mills and steel works in West Virginia: 8. Of these 1 makes Bessemer steel; 1 Bessemer steel plant building.

KENTUCKY.

Anchor Iron and Steel Works, L. M. Dayton, 184 West Second st., Cincinnati, Ohio. Works at Newport, Campbell county, Ky. Rebuilt and fitted with new machinery in 1874; 5 single puddling furnaces, 4 heating furnaces, 2 scrap furnaces, and 4 trains of rolls (one 10, one 18, and two 20-inch); product, bar, sheet, and plate iron; annual capacity, 6,000 net tons. These works are operated in connection with the American Bolt and Nut Works, owned by the same person. John Phillips, Superintendent.

Central Rolling Mill, B. Du Pont, owner, Brook st., Louisville. Built in 1849; 20 single puddling furnaces, 1 scrap furnace, 5 heating furnaces, 1 hammer, and 5 trains of rolls (two 8, one 16, one 18, and one 22-inch). First called Louisville Rolling Mill. Idle.

Crucible Steel Casting and Metal Company, Louisville. Built in 1879-80; 5 steel-melting holes; 10 pots can be used at each heat. Has been idle for the past two years, and will probably never run again.

Licking Iron Works, Licking Rolling Mill Company, northeast corner Front and Vine sts., Cincinnati. Works at Covington, Ky. Built in 1845; 6 double puddling furnaces, 7 heating furnaces, 2 scrap furnaces, 6 knobbling fires, 1 hammer, and 5 trains of rolls (one 16-inch muck, one 16-inch bar, one 8-inch guide, one 22-inch boiler plate, and one 20-inch sheet); product, merchant bar, bridge, boiler, and sheet iron, rivets, angle and tee iron, jail, sash, and corrugated roofing iron; annual capacity, 9,000 net tons; special products, boiler plate, shafting, charcoal bar, angle, and tee iron. H. Worthington, President; I. Droege, Vice-President and Treasurer; I. Droege, Jr., Secretary.

Mitchell, Tranter & Co., Second and Race sts., Cincinnati. Works at Covington, Ky. Built in 1873; 4 knobbling, 10 puddling, 2 scrap, 2 slab, and 2 plate-mill furnaces, 2 annealing and 5 heating furnaces, 2 steam hammers, and 6 trains of rolls; one 7-gross-ton Siemens open-hearth steel furnace, built in 1879; product, plate, sheet, channel, angle, and merchant iron, boiler plate, and plow steel; annual capacity, 12,000 net tons. Brand, "O. V." Walter J. Mitchell, President; Charles J. Tranter, Vice-President; Frank P. Mitchell, Secretary; J. R. Williamson, Treasurer.

Norton Iron Works, Ashland, Boyd county. Put in operation in March, 1874; destroyed by fire in 1883, and rebuilt; 20 single puddling furnaces, 4 heating furnaces, 126 nail machines, and 2 trains of rolls (one 20 and one 22-inch); product, nails; annual capacity, 200,000 kegs. John Russell, President and General Manager; D. B. Meacham, Secretary; Hugh Means, Treasurer; John Russell, Manager. Charles L. Colburn, Agent, No. 3 Johnston Building, Cincinnati. *See Furnaces.*

Swift's Iron and Steel Works, 26 West Third st., Cincinnati, Ohio. Works at Newport, Campbell county, Ky., (opposite Cincinnati.) Built in 1857, and enlarged in 1872; 29 single puddling and 14 heating furnaces, 3 sheet box annealing furnaces, 4 forge fires, and 9 trains of rolls (8, 10, and 18-inch bar trains, 2 forge, 2 sheet, and 2 plate trains). Product: Swift's hammered soft flange boiler, flange sheet, and tank steel; bloom flange and C. H. No. 1 boiler, tank, and light and heavy sheet iron; bar, shafting, bridge, car, angle, tee, and other shapes, and mine T and street rails; annual capacity, 25,000 net tons of boiler, tank, and heavy sheet iron and steel; 30,000 net tons of bar, angle, and shaped iron and T rails; 7,000 tons of light sheet iron. E. L. Harper, President; Geo. E. Clymer, Vice-President; J. L. Pfau, Secretary; J. H. Mathews, Treasurer. *See Furnaces. See Riverside Iron and Steel Works, Ohio.*

Tennessee Rolling Works, Ewald Iron Company, 801 North Second st., St. Louis, Mo. Works at Tennessee Rolling Works P. O., Lyons county, Ky. Built in 1846; 9 single puddling furnaces, 13 knobbling fires, 7 heating furnaces, 2 hammers, and 5 trains of rolls (8-inch guide, 9

and 16-inch bar, and 22 and 26-inch plate trains); product, boiler plate, sheet iron, bar and rod iron, and blooms; annual capacity, 4,000 net tons. L. P. Ewald, President.

Number of rolling mills and steel works in Kentucky: 8. Of these 1 makes open-hearth steel and 1 makes crucible steel.

TENNESSEE.

Knoxville Iron Company, Knoxville, Knox county. Built in 1865; 9 single puddling furnaces, 3 heating furnaces, 41 nail machines, and 4 trains of rolls (15-inch muck, 18-inch nail plate, 16-inch bar, and 8-inch guide); product, merchant bar, nails, railroad and boat spikes, fish-plates, bolts, nuts, wrought washers, railroad, car, and miscellaneous forgings, and light T and street rails; annual capacity, 12,000 net tons. W. R. Tuttle, President; W. S. Mead, Secretary and Treasurer.

Lookout Rolling Mill, P. O. Box 624, Chattanooga. Started in October, 1876; 4 double puddling and 2 heating furnaces, 2 trains of rolls, and 1 spike machine; product, merchant bar iron, 10 to 16-lb. T rails, rail splices, and railroad spikes; annual capacity, 5,000 net tons. Formerly owned by the Tennessee Iron and Steel Company. A. M. Johnson, President, Treasurer, and Manager; J. W. Thornton, Secretary.

Roane Iron Company, Chattanooga, Hamilton county. Rolling mill built in 1864; puddle mill built in 1869; 9 double puddling furnaces, 10 heating furnaces, 1 hammer, and 3 trains of rolls (two 18 and one 20½-inch); product, rails; annual capacity, 40,000 net tons. Steel plant added in 1877-8; first cast made June 6, 1878; melting house, 80 ft. x 130 ft.; two 10-gross-ton Siemens open-hearth steel furnaces; 12 gas producers; 36-inch Fritz blooming mill; use the "pig-ore-and-scrap" process; product, steel for merchant and rail purposes. H. S. Chamberlain, President; H. Clay Evans, Secretary. *See Furnaces.*

Southern Steel Works, Chattanooga. Removed from Kingston in 1877; remodeled and enlarged in 1883; 2 puddling furnaces, 1 heating furnace, one 4-pot steel furnace, and 2 hammers; product, best cast steel, suitable for machinery and edge tools. John W. Baker, President; John Leighton, Vice-President and General Manager; Arthur Leighton, Secretary and Treasurer.

South Tredegar Iron Company, Chattanooga. Main office, St. Louis, Mo. Built in 1866; 2 single and 4 double puddling furnaces, 7 heating furnaces, 74 nail machines, 1 squeezer, and 3 trains of rolls (one muck, one nail-plate, and one guide train); product, nails, railroad spikes, splice bars, and washers; annual capacity, 160,000 kegs of nails and 2,000 net tons of other products. Formerly known as the Vulcan Iron and Nail Works. H. L. Fox, President, St. Louis; C. E. Rubedeaux, Secretary; J. M. Duncan, Vice-President and Superintendent of works. Selling agent, John T. Fox.

Number of rolling mills and steel works in Tennessee: 5. Of these 1 makes open-hearth steel and 1 makes crucible steel.

OHIO.

LAKE COUNTIES.

Britton Iron and Steel Company, Cleveland, Cuyahoga county. Built in 1851; rebuilt in 1873; 5 single puddling and 10 knobbling furnaces, 7 heating furnaces, 3 trains of rolls, and 1 hammer; product, black and galvanized sheet iron; annual capacity, 5,000 net tons. Formerly called Cleveland Boiler Plate Manufacturing Company and afterwards Standard Iron Company. J. W. Britton, President and Manager; Harvey H. Brown, Vice-President; Ralph W. Hickox, Secretary and Treasurer.

Cleveland Hardware Company, Euclid Avenue Station, Cleveland. Built in 1879; 1 heating furnace and one 9-inch train of rolls; product, shapes for wagon hardware, rolled from muck bar; annual capacity, 2,500 net tons. L. McBride, President; A. W. Train, Secretary; S. E. Brown, Treasurer and Manager.

Cleveland Rolling Mill Company, Cleveland. Works principally located at Newburgh. Bessemer steel works, built in 1867-8; made first blow October 15, 1868; two 10-gross-ton converters; annual capacity, 110,000 net tons Bessemer steel ingots. Siemens-Martin steel works, built in 1876-8; contain five open-hearth furnaces—two 15-gross-ton and three 7-ton furnaces; annual capacity, 40,000 tons of open-hearth steel ingots. Rail mills, built in 1857; 5 heating furnaces, 1 train of rolls, and blooming mill; annual capacity, 100,000 tons of rails. Four rod mills; 4 trains of rolls; annual capacity, 60,000 tons. Wire mills built in 1868; employ 2,000 men; annual output, 35,000 tons of finished wire. Plate mills consist of 6 single puddling furnaces and 4 trains of rolls (muck mill, 2 sheet mills, and plate mill); galvanizing works attached; annual capacity, 10,000 tons. The company also has a foundry, forge, machine shops, and blast furnaces. Lake Shore Mill, at Cleveland, built in 1852; 4 puddling furnaces, 7 heating furnaces, and 2 trains of rolls; product, iron rails; annual capacity, 30,000 tons. The mill has been repaired with a view to rolling steel rails, with a daily capacity of 135 net tons. The works formerly operated by the Cleveland Iron Company, leased by the Cleveland Rolling Mill Company, consist of 19 single puddling furnaces, 11 heating furnaces, 5 trains of rolls, and 1 hammer; annual capacity, 40,000 tons of iron rails and merchant bar iron. The mill is used for rolling steel rails at the rate of 100 tons per day. Product, wire, tire, and spring steel, galvanized and black sheet iron, horse shoes, steel plate, boiler and tank plate, corrugated roofing and siding, Siemens-Martin steel, Bessemer steel rails, and iron rails. William Chisholm, President; S. H. Chisholm, Vice-President; E. S. Page, Secretary; W. B. Chisholm, General Manager. *See Furnaces.*

Cleveland Steel Company, Garden st., crossing C. & P. R. R., Cleveland. Built in 1880; 8 steel-melting holes, 5 heating furnaces, one 9-inch train of rolls, and 3 hammers; 32 pots can be used at each heat;

product, tool, machinery, and spring steel; annual capacity, 2,400 net tons. J. H. Clark, President; E. M. Grant, Secretary, Treasurer, and Superintendent. Contemplates erecting an open-hearth plant.

Forest City Iron Works, Atkins, Clark & Co., Cleveland. Built in 1866-7; remodeled in 1882; 17 single puddling and 4 heating furnaces, and 4 trains of rolls (7, 9, 12, and 18-inch); product, band and light bar iron; specialties, nut, bolt, and carriage iron; annual capacity, 12,000 net tons. Formerly part of the Union Iron Works.

H. P. Nail Company, Cleveland, Cuyahoga county. Built in 1880, and first put in operation in March, 1880; 2 heating furnaces, one 9-inch and one 18-inch train of rolls, and 85 wire-nail machines; product, steel-wire nails, steel-wire rods, and steel wire; annual capacity, 50,000 kegs wire nails and 20,000 net tons rods and wire. C. B. Beach, President; S. H. Chisholm, Vice-President; M. Baackes, Manager.

Lake Erie Iron Works, Lake Erie Iron Company, office and warehouse, 104 and 106 St. Clair st., Cleveland. Built in 1852; 16 puddling furnaces, 19 heating furnaces, 4 trains of rolls, and 13 hammers; product, steel axles, iron fagoted car and locomotive axles, iron and steel forgings of every description, iron shafting up to 20-inch round, and merchant bar iron; annual capacity, 19,000 net tons. Nut and bolt works recently added, producing 20 tons daily of nuts and bolts of every description used by railroads, car builders, and for agricultural implements. W. C. Scofield, President; Edward Lewis, Vice-President; C. W. Scofield, Secretary and Treasurer; James E. Lewis, Superintendent; R. H. Lewis, Business Manager.

Maumee Rolling Mill, Maumee Rolling Mill Company, Toledo, Lucas county. Built in 1883-4, and put in operation in the beginning of October, 1884; 10 double puddling furnaces, 8 forge fires, 12 heating furnaces, 7 trains of rolls, (one 3-high plate, two 40 x 22-inch sheet, one 3-high 18-inch bar, one 3-high 18-inch forge, one 8-inch hoop and band, and one 10-inch,) and 1 hammer; product, bar, sheet, hoop, tank, angle, tee, and merchant bar iron; annual capacity, 17,000 net tons. The mill is also designed for rolling steel. H. S. Walbridge, President; I. Droege, Vice-President; E. Van Hoosen, Secretary; H. S. Worthington, Treasurer.

Otis Iron and Steel Works, Otis Iron and Steel Company, Cleveland. Built in 1873-4, and put in operation January 1, 1875; 7 Siemens heating furnaces, 4 hammers, four 15-gross-ton Siemens open-hearth furnaces, and 4 trains of rolls (one 10, one 20, and two 31-inch); product, steel plate, bar steel, and forgings; annual capacity, 20,000 net tons. One 5-ton converter, for the production of Bessemer steel, erected in 1884. Charles A. Otis, President; Thomas Jopling, Treasurer; J. K. Bole, Secretary; S. T. Wellman, Superintendent.

Sandusky Rolling Mill, Sandusky, Erie county. Put in operation in October, 1873; 6 single puddling furnaces, 8 heating furnaces, 1 hammer, and 2 trains of rolls (one 18 and one 19-inch); owned by the Nes Silicon Steel Company. Idle and for sale.

Union Iron Works, Union Rolling Mill Company, 122 Water st., Cleveland. Works at Newburgh. Built in 1866-7; 16 single puddling and 5 heating furnaces, and 4 trains of rolls; product, bar iron and light T and street rails; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 110 net tons of finished iron. S. W. Sessions, President; A. S. Upson, Vice-President; A. R. Treadway, Secretary; S. A. Fuller, General Manager and Treasurer; J. Morgan Coleman, Superintendent. *See Furnaces.*

Number of rolling mills and steel works in the Lake region: 12. Of these 2 make Bessemer steel, 2 make open-hearth steel, and 1 makes crucible steel.

MAHONING VALLEY.

Akron Iron Works, Akron Iron Company, Akron, Summit county. Built in 1866; 19 single puddling furnaces, 1 scrap furnace, 4 heating furnaces, and 3 trains of rolls; product, best common, refined, and charcoal bar iron, hot-polished shafting, and light T rails from 10 to 30 lbs. per yard; specialties, patent hot-polished shafting and irons for agricultural implements; annual capacity, 8,500 net tons. L. Miller, President; J. A. Long, Secretary; and Frederick Bishop, Superintendent.

Cleveland, Brown & Co., Cleveland. Mill at Niles, Trumbull county. Built in 1841; 18 puddling and 6 heating furnaces, and 5 trains of rolls; product, bar, plate, and sheet iron; annual capacity, 10,000 net tons. Formerly part of the works of James Ward & Co.

Cuyahoga Forge and Iron Company, Cuyahoga Falls, Summit county. Built in 1865; rebuilt in 1884; 1 heating furnace, and one 20-inch and one 8-inch train of rolls; product, hollow mandrel rolled iron and stay-bolt iron; annual capacity, 1,000 net tons.

Enterprise Iron Works, Cartwright, McCurdy & Co., Youngstown, Mahoning county. Built in 1863 and 1874; 30 single puddling furnaces, 6 heating furnaces, and 6 trains of rolls (one 6, one 7, two 8, one 10, and one 16-inch); product, hoops, bands, horse-shoe iron, and bar iron; annual capacity, 12,000 net tons. Myron C. Wick, President; H. O. Bonnell, Vice-President; W. E. Taylor, Secretary and Treasurer; James Cartwright, Manager.

Falcon Iron and Nail Works, Falcon Iron and Nail Company, Niles, Trumbull county. Built in 1867; 16 single puddling and 3 heating furnaces, 44 nail machines, 1 spike machine and furnace, and 3 trains of rolls (one 8, one 18, and one 21-inch); product, nails, guide iron, and railroad spikes; annual capacity, 100,000 kegs of cut nails and 5,000 net tons of guide iron and spikes. Robert McCurdy, President; Tod Ford, Vice-President; Myron I. Arms, Secretary and Treasurer.

Grasshopper Iron Works, The Arms, Bell & Company, Youngstown. Formerly called Turner Spike Works. Built in 1876; 2 heating furnaces, one 10-inch train of rolls, 3 spike machines, 6 nut machines, and 2 rivet machines; product, bar iron, spikes, rivets, and nuts;

annual capacity, single turn, 9,000 net tons bar iron, 2,500 tons spikes, 400 tons rivets, and 1,200 tons hot-punched nuts. The same company operates the Glencoe Iron Works, making bolts, nuts, and washers. Frank B. Williams, President and Treasurer; Joseph B. Wilder, Vice-President; Wm. H. Wick, Secretary.

Hall Iron Works, Jesse Hall & Son, Hubbard, Trumbull county. Put in operation in November, 1872; 1 double and 10 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8, one 12, and one 16-inch); product, merchant bar iron; specialty, horse-shoe bar and bolt and nut iron; annual capacity, 6,000 net tons.

Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown, Mahoning county. Built in 1846; 42 double and 40 single puddling furnaces, 19 heating furnaces, 50 nail machines, 1 hammer, 6 spike machines, and 13 trains of rolls (two 8, two 10, one 12, one 18, two 20-inch, 1 sheet, and 4 muck); product, merchant bars, sheets, nails, and railroad and boat spikes; annual capacity, 130,000 kegs of nails and 68,000 net tons of other products. Brand, "Mahoning." Incorporated in September, 1875. D. B. Chambers, Receiver's Agent; John I. Williams, General Manager. *See Mahoning Valley Furnaces.*

Mahoning Valley Works, Mahoning Valley Iron Company, Youngstown, Mahoning county. Built in 1871; 1 single and 28 double puddling furnaces, 8 heating furnaces, and 4 trains of rolls (one 18, one 16, one 9, and one 7-inch); product, merchant bar iron and angles; annual capacity, 40,000 net tons. Richard Brown, General Manager. Formerly called Valley Iron Works, afterwards Ridgway Iron Works, and built to make rails. *See Mahoning Valley Furnaces.*

Niles Iron Works, Andrews Brothers & Co., Youngstown, Mahoning county. Built at Niles, Trumbull county, in 1872, and removed to Haselton, Mahoning county, in 1880-1; 19 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, bar, sheet, rod, skelp, and band iron; annual capacity, 12,000 net tons. *See Furnaces.*

Russia Sheet-Iron Mills, Niles, Trumbull county. Built in 1864; 9 puddling furnaces, 4 heating furnaces, 1 scrap furnace, and 3 trains of rolls. Owned by the First National Bank of Warren. Idle. Formerly part of the works of James Ward & Co.

Summers Iron Works, Summers Brothers & Co., Struthers, Mahoning county. Built in 1881-2; 1 double and 2 single puddling furnaces, 1 pair furnace, 1 heating furnace, 3 patent box annealing furnaces, and 1 sheet mill; product, sheet iron and shingle bands; capacity, 9 net tons of sheet iron per day and 20 tons of shingle bands per month. Will add another sheet mill and a plate mill, with 9 double puddling and 2 heating furnaces, 1 hammer, and all necessary machinery to make all kinds of plate and sheet iron. James Summers, General Manager.

Trumbull Iron Company, Girard, Trumbull county. Built in 1872 by the Girard Rolling Mill Company; put in operation September 1, 1873;

- purchased by the present company in 1878; 17 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, all sizes of merchant bar and small T rails; special attention given to the manufacture of irons for agricultural implements, guard and finger iron, drag and brace bars, knife-back iron, cylinder-bar and tooth irons for threshers, chain, bolt, and nut iron; annual capacity, 10,000 net tons. Henry Wick, President; John C. Wick, Vice-President; Myron C. Wick, Secretary; G. D. Wick, Treasurer and General Manager.
- Warren Rolling Mill, C. Westlake & Co., I. Palmer Freer, Assignee, Warren, Trumbull county. Built in 1870, burned in 1878, and rebuilt in 1879; 16 single puddling furnaces, 2 heating furnaces, and 2 trains of rolls (18-inch muck and bar and 10-inch guide); product, muck bar, railroad links and pins, and bar iron of all sizes; annual capacity, 9,000 net tons.
- Youngstown Rolling Mill, Youngstown Rolling Mill Company, Youngstown. Built in 1871; burned and rebuilt in 1877; 21 single puddling furnaces, 5 heating furnaces, and 4 trains of rolls (7, 8, 12, and 20-inch); product, hoop, band, hame, box, pole-cap, and tire iron and steel, and cotton ties; annual capacity, 10,000 net tons. Paul Wick, President; Thomas H. Wells, Vice-President; Henry Wick, Secretary and Treasurer.
- Youngstown Steel Company, Youngstown, Mahoning county. Built in 1882-3, and put in operation in March, 1883; one 20-ton Siemens open-hearth steel furnace. John Stambaugh, President; Paul Jones, Secretary and Treasurer; Tod Ford, Business Manager.
- Number of rolling mills and steel works in the Mahoning region: 16. Of these 1 is an open-hearth steel works.

INTERIOR COUNTIES.

- Canton Steel Works, Bolton Steel Company, Canton, Stark county. Built in 1872; 10 heating furnaces, 3 welding furnaces, 4 hammers, one 12-inch and one 20-inch train of rolls, and one 10-gross-ton Siemens open-hearth steel furnace; first open-hearth steel made August 17, 1875; product, tool steel, machinery steel, cast steel, and spring steel; annual capacity, 3,350 net tons of steel ingots. Brand, "Canton." Ogden Bolton, President; R. H. Bulley, Vice-President and Treasurer; Alexander Thomas, Secretary; H. A. Weaver, Superintendent.
- Cherry Valley Iron Works, Leetonia, Columbiana county. Formerly called Leetonia Iron and Coal Company. Built in 1871; 1 double and 16 single puddling furnaces, 1 scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 16, and one 18-inch); product, muck bar, merchant bar, and guide iron; annual capacity, 10,000 net tons. J. H. King, President; C. N. Schmick, Secretary and Treasurer; J. G. Chamberlain, Superintendent. Selling agents, King, Gilbert & Warner, Columbus and Cleveland. *See Furnaces.*
- Columbus Iron Works, P. Hayden & Sons, Columbus, Franklin county.

- Built in 1854; 7 single puddling furnaces, 7 heating furnaces, 1 hammer, and 4 trains of rolls; product, merchant bars, light T rails, wire rods, and iron for harness and saddle work and for all kinds of chains; annual capacity, single turn, 4,000 net tons.
- Columbus Rolling Mill, Columbus Rolling Mill Company, Columbus, Franklin county. Built in 1872; 10 single puddling furnaces, 14 heating furnaces, and 3 trains of rolls; product, iron and steel rails; annual capacity, 40,000 net tons. S. Churchill, President and General Manager; D. S. Gray, Vice-President; W. S. S. Rodgers, Secretary and Treasurer.
- Dover Rolling Mill, Reeves Iron Company, Canal Dover, Tuscarawas county. Built in 1865-6; first iron rolled in February, 1866; 12 puddling furnaces, 1 heating furnace, and 3 trains of rolls; product, skelp iron; annual capacity, 6,000 net tons.
- Goshen Iron Company, New Philadelphia, Tuscarawas county. Office, Warren. Built in 1883; 20 single puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, sheets, plates, bands, and small rounds and squares.
- Massillon Rolling Mill, Joseph Corns & Son, Massillon, Stark county. Built in 1873, and put in operation January 4, 1875; 8 single puddling furnaces, 2 heating furnaces, and one 9-inch and one 18-inch train of rolls; product, bar iron and light T rails; annual capacity, 6,000 tons.
- Solid Steel Company, Alliance, Stark county. One 10-ton open-hearth steel furnace, built in 1883; first steel cast in August, 1883; product, steel castings. T. R. Morgan, Sr., President; S. J. Williams, Secretary and Treasurer.
- Whitely, Fasler & Kelley, Springfield, Clark county. Building a Siemens-Martin steel plant and a mill to roll the product.
- Zanesville Iron Works, Ohio Iron Company, Zanesville, Muskingum county. The first mill of these works was built in 1848; present company was incorporated in 1857, and has operated the works since then; now comprise 22 single puddling furnaces, 2 scrap furnaces, 7 heating furnaces, (all constructed so as to embrace the points covered by A. F. Cassel's improved patent furnace,) 1 hammer, 2 spike machines, and 5 trains of rolls (two 8, one 10, one 16, and one 18-inch); product, assorted merchant bar iron, light T and street rails, and railroad spikes; specialty, agricultural irons; annual capacity, 14,000 net tons. M. Churchill, President; C. W. Greene, Secretary and Treasurer; A. F. Cassel, Superintendent. *See Furnaces.*
- Number of rolling mills and steel works in Central Ohio: 9 completed, and 1 building. Of these 2 make open-hearth steel; 1 open-hearth steel works building.

OHIO RIVER COUNTIES.

- Ætna Iron and Nail Company, Bridgeport, Belmont county. Built in 1873, and put in operation January 1, 1874; enlarged in 1883; 32 single puddling furnaces, 1 scrap furnace, 15 heating furnaces, 4 annealing

- furnaces, and 8 trains of rolls (one 8, one 9, one 16, one 18, three 20, and one 22-inch); product, bars, sheets, plates, and bands, and light T and street rails; annual capacity, 20,000 net tons. Have never made any nails. W. W. Holloway, President; W. H. Tallman, Secretary; Lewis Jones, Manager.
- Alikanna Rolling Mill, Steubenville, Jefferson county.** Built in 1871-2; 12 puddling furnaces, 2 heating furnaces, and 2 trains of rolls (one 8 and one 15-inch); product, bar, rod, band, hoop, and guide iron, and light T rails. Idle since the failure of Sharpe & Daniels in 1883.
- Belfont Iron Works, Belfont Iron Works Company, Ironton, Lawrence county.** Built in 1852; 21 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 126 nail machines; product, nails; annual capacity, 300,000 kegs. F. D. Norton, President; L. T. Dean, Vice-President; B. H. Burr, Secretary and Treasurer. *See Furnaces.*
- Bellaire Nail Works, Bellaire, Belmont county.** Built in 1867, and put in operation in February, 1868; 26 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 124 nail machines; product, steel nails and spikes; annual capacity, 270,000 kegs. Bessemer steel works built in 1883-4; two 4-gross-ton converters; first blow made April 28, 1884; 2 heating furnaces; product, steel, used by the company for nails, and billets and blooms. J. R. McCortney, President; A. D. Hilborn, Secretary; James Wilson, Agent. *See Furnaces.*
- Burgess Steel and Iron Works, Portsmouth.** Built in 1871; 9 single puddling furnaces, 12 heating furnaces, one 24-pot Siemens crucible steel furnace, one 8-gross-ton Siemens open-hearth steel furnace, 3 trains of rolls, (one 8, one 18, and one 20-inch,) and 5 steam hammers; 24 pots can be used at each heat in steel works; product, plow steel, (Siemens-Martin, puddled, German, and iron-centre crucible cast,) tool steel, steel and iron boiler plate, "U. S. Norway" refined iron, blooms, five-ply safe steel, and hot-polished shafting; annual capacity, 7,000 net tons. George Davis, President; L. C. Robinson, Vice-President; E. N. Hope, Secretary and Treasurer; L. D. York, Superintendent.
- Cincinnati Rolling Mill, Cincinnati, Hamilton county.** Built in 1864, and enlarged in 1881; 9 Danks rotary puddling furnaces, 10 heating furnaces, one large 3-high plate train of rolls, two 21-inch trains, one squeezer, and one 5-ton hammer; product, superior plate iron, rails, beams, and angles; annual capacity, 13,000 net tons of plate iron and 12,000 net tons of beams, angles, and rails. Idle.
- Cincinnati Rolling Mills and Chain Works, Queen City Iron Company, Cincinnati.** Works on Gest st. and C. H. & D. R. R. Built in 1876; 2 heating furnaces and 2 trains of rolls (one 10 and one 16-inch); product, special fancy irons and patent horse-shoe bar; annual capacity, 3,000 net tons. Formerly called Empire Rolling Mill. L. Benjamin, President; E. Benjamin, Secretary and Treasurer.
- Crescent Iron Works, T. A. Watson & Co., Pomeroy, Meigs county.** Built in 1847; 3 double and 11 single puddling furnaces, 6 heating furnaces, 5 trains of rolls; product, band, hoop, and refined iron; annual ca-

capacity, 6,000 net tons. Brand, "Crescent." Formerly called Pomeroy Iron Works.

Globe Rolling Mill Company, offices at 163 and 165 West Pearl st., Cincinnati. Mill No. 1, at 413 West Front st., built in 1845; 9 single puddling furnaces, 3 scrapping furnaces, 4 heating furnaces, 3 knobbling fires, 5 trains of rolls, (two 8-inch guide, one 14-inch bar, one 18-inch sheet, and one 20-inch muck bar,) and 1 hammer; product, bar, sheet, and plate iron; annual capacity, 7,000 net tons of bar iron and 1,500 net tons of sheet and plate iron; also produce wire rods and wire; annual capacity, 1,000 net tons of wire. Mill No. 2 has been idle since October, 1882, and is for sale; 10 single puddling furnaces, 4 heating furnaces, 2 scrap furnaces, and 3 trains of rolls. Joseph Kinsey, President; Jacob Walter, Vice-President; L. F. Phipps, Secretary; James Bryan, Superintendent.

Ironton Rolling Mill, New York and Ohio Iron and Steel Company, Ironton, Lawrence county. Built in 1852, and enlarged several times since; 21 single puddling furnaces, 7 heating furnaces, and 5 trains of rolls; product, sheet and plate iron, merchant iron, and light rails; annual capacity, double turn, 13,000 net tons. C. H. Bliss, President; J. H. Kean, Vice-President; J. H. Montgomery, Secretary and Treasurer; B. M. Caldwell, Manager. *See Furnaces.*

Jefferson Iron Works, Steubenville, Jefferson county. Built in 1855; 21 single puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 136 nail machines; product, nails; annual capacity, 340,000 kegs. Brand, "Jefferson Iron Works." W. H. Wallace, President; Calvin B. Doty, Vice-President; G. P. Harden, Secretary and Treasurer; Wm. R. E. Elliott and W. L. Elliott, Forge Managers; C. B. Doty and W. H. McClin-ton, Managers of nail factory. *See Furnaces.*

Junction Iron Company, Wheeling, W. Va. Works at Mingo Junction, Jefferson county, Ohio. Built in 1882, and put in operation November 1, 1882; 24 single puddling and 4 heating furnaces, 2 trains of rolls, and 126 nail machines; product, cut nails and spikes; annual capacity, 350,000 kegs. Brand, "Junction Iron Co." Samuel Laughlin, President; George A. Laughlin, Secretary and Treasurer; James A. Crouley, Superintendent. Selling agents, Wm. K. Ross, New York; James W. Ross, Chicago; John W. Gates, St. Louis. *See Furnaces.*

Kelly Nail and Iron Company, Ironton, Lawrence county. Built in 1883, and first put in operation November 1, 1883; 16 double puddling furnaces, 3 heating furnaces, and 100 nail machines; product, cut nails and spikes; annual capacity, 250,000 kegs. William D. Kelly, President; Ironton A. Kelly, Vice-President; Oscar Richey, Secretary and Treasurer.

Laughlin Nail Company, Wheeling, W. Va. Works at Martin's Ferry, Belmont county, Ohio. Built in 1873-4; were destroyed by fire August 8, 1881, but were immediately rebuilt; 24 puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 114 nail machines; first keg of nails was made March 4, 1874; product, cut nails and spikes; annual

capacity, 12,500 net tons. Formerly called Ohio City Iron and Nail Works. Alexander Laughlin, President; W. L. Glessner, Secretary. Lawrence Iron Works, Lawrence Iron Works Company, Ironton. Built in 1853; 19 single puddling furnaces, 6 heating furnaces, and 5 trains of rolls (two 8, one 9, one 16, and one 18-inch); product, bar, band, chain, spike, and hoop iron of every variety, cotton ties, and light T rails from 8 to 30 lbs.; annual capacity, 10,000 net tons. Specialties, chain iron, iron fencing, concave tires, and cotton ties. Cyrus Ellison, President; James Thomas, Vice-President; F. C. Tomlinson, Secretary and Treasurer; Geo. T. Scott, General Superintendent. Selling agents, John F. Hazen & Co., Cincinnati.

Marietta Rail Mill, estate of Wm. Lottimer, Marietta, Washington county. Built in 1867; 12 single puddling furnaces, 9 heating furnaces, 4 trains of rolls, (one 12, one 16½, and two 18-inch,) and 1 squeezer; two 8-inch 3-high guide trains and one 12-inch fish-plate train in warehouse, not set up; product, rails, fish-plates, and bar, hoop, and bridge iron; annual capacity, 30,000 net tons. Idle since 1876, and for sale. R. K. Shaw, Marietta, Ohio, will furnish information, terms, etc.

Portsmouth Iron and Steel Works, John Means, trustee, Ashland, Ky. Works at Portsmouth, Scioto county. Built in 1832; 19 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 2 hammers; iron products, boiler plate, tank plate, sheet iron, bar and hoop iron, railroad spikes, small T rails, splice bars, and bolts; annual capacity, 11,000 net tons. One 10-gross-ton Siemens open-hearth steel furnace, built in 1879; steel products, boiler plate, spring steel, agricultural steel, tire steel, machinery steel, etc.; annual capacity, 4,500 net tons ingots. Idle and for sale. Previous to 1879 these works were operated by the Gaylord Rolling Mill Company, but from 1879 to January 1, 1884, they were leased by the Portsmouth Iron and Steel Company.

Riverside Iron and Steel Works, Swift's Iron and Steel Works, lessee, 26 West Third st., Cincinnati. Rolling mill at Riverside, Hamilton county. Built in 1880 by Peter Zinn and others, and purchased by E. L. Harper in March, 1881; greatly enlarged in 1882; 10 single puddling furnaces, 8 heating furnaces, 3 box annealing furnaces, pair furnaces, one 4-ton hammer, 1 muck and billet train, 1 plate train, with 1 set 7-foot and 1 set 62-inch chill rolls, and 2 sheet trains; specialty, flange bloom boiler plate and heads, boiler steel, tank iron, and light and heavy sheet iron; annual capacity, 12,000 net tons of boiler and tank iron, boiler steel, and heavy sheet iron, and 40,000 bundles, or 3,000 net tons, of light sheet iron. E. L. Harper, President; Geo. E. Clymer, Vice-President; J. L. Pfau, Secretary; J. H. Mathews, Treasurer. *See Rolling Mills and Blast Furnaces in Kentucky.*

Spaulding Iron Company, Brilliant, Jefferson county. Built in 1882-3, and rolling mill started in September, 1883, and first nails cut January 1, 1884; 20 single puddling furnaces, 4 heating furnaces, 4 trains of rolls, and 76 nail machines; product, nails and muck bar; annual capacity, 228,000 kegs of cut nails. D. Spaulding, President; C. H.

Spaulding, Vice-President and Secretary. The company intends soon to add 24 nail machines.

Standard Iron Company, Bridgeport, Belmont county. Built in 1882-3, and put in operation April 1, 1883; 8 single puddling furnaces, 2 heating furnaces, and 6 trains of rolls (two 20 x 36, three 20 x 40, and one 22 x 50); product, all grades of plain and corrugated sheet iron; annual capacity, 5,000 net tons. L. Spence, President; W. T. Graham, Secretary; T. B. May, Manager. Selling agents, H. L. Green & Bro., Chicago, and Melest & Harris, Cincinnati.

Wellsville Plate and Sheet Iron Company, Wellsville, Columbiana county. Main office at Pittsburgh, Pa. Mill built in 1873 to make tin-plate; remodeled in 1880; 8 single puddling furnaces, 2 heating furnaces, and 2 22-inch trains of rolls; product, plate and sheet iron; annual capacity, 2,500 net tons. P. F. Smith, President and Manager; C. L. Umbstaetter, Vice-President; Alan W. Wood, Secretary and Treasurer.

Number of rolling mills and steel works in the Ohio river counties: 22.

Of these 2 make open-hearth steel, 1 makes Bessemer steel, and 1 makes crucible steel.

Total number of rolling mills and steel works in Ohio: 59 completed, and 1 building. Of these 3 make Bessemer steel, 2 make crucible steel, and 7 make open-hearth steel, and 1 open-hearth steel works building.

INDIANA.

Central Iron and Steel Company, Brazil, Clay county. Built in 1882-3, and first put in operation January 12, 1883; 4 double puddling furnaces, 1 forge fire, 7 heating furnaces, 3 trains of rolls, (one 10 and two 20-inch,) and 2 steam hammers; product, bar and bridge iron, light T rails, railroad car and locomotive axles, and general forgings; special attention given to car specifications; annual capacity, 5,000 net tons. Major Collins, President; Charles Minshall, Secretary and Treasurer.
See Furnaces.

Cobb's Iron and Nail Company, Aurora, Dearborn county. Built in 1875-8; 10 single puddling furnaces, 12 heating furnaces, 42 nail machines, 1 hammer, 3 nut machines, 3 nut furnaces, 1 double and 1 single machine for making washers, 1 bolt machine, 2 nut-tapping machines, 3 bolt-threading machines, and 5 trains of rolls (22-inch sheet and plate train, 18-inch bar, 18-inch muck, 8-inch train, and 20-inch nail plate). The works are prepared to make sheet, plate, angle, hoop, and bar iron, patent cut nails, hot-pressed nuts, bolts, and washers, but the company is at present only operating the nail department; the nails are produced from wrought scrap iron; annual capacity, 14,000 net tons. The company is now adding 8 nail machines. O. P. Cobb, President; J. A. Stratton, Secretary; John Black, Supt.

Greencastle Iron and Nail Company, Greencastle, Putnam county. Put in operation in January, 1868; 4 double and 8 single puddling furna-

- ces, 3 heating furnaces, 1 annealing furnace, two 18-inch trains of rolls, and 45 nail machines; product, nails and spikes; annual capacity, 100,000 kegs. J. F. Darnall, President; H. M. Thomas, Superintendent of works; G. H. Brown, Secretary and Treasurer.
- Indianapolis Rolling Mill, Indianapolis Rolling Mill Company, Indianapolis, Marion county. Built in 1857; 4 double and 2 single puddling furnaces, 8 heating furnaces, and 3 trains of rolls; product, light and heavy rails; annual capacity, 30,000 net tons. Steel rail mill built in 1881-2, but not yet put in operation; capacity, 165 net tons of steel rails in twenty-four hours. Aquilla Jones, President; John Thomas, Treasurer; W. H. Thomas, Assistant Treasurer; S. W. Morgan, Secretary and Superintendent.
- New Albany Rail Mill Company, New Albany, Floyd county. Built in 1864; 5 double and 6 single puddling furnaces, 5 forge fires, 11 heating furnaces, 3 spike machines, and 4 trains of rolls; product, iron T rails, (8 to 65 lbs.), tram rails, street rails, bars, angles, fish-plates, spikes, washers, etc.; annual capacity, 35,000 net tons. Brand, "N. A." W. C. DePauw, President; C. W. DePauw, Vice-President; Albert Trinler, General Manager.
- Ohio Falls Iron Works, New Albany, Floyd county. Built in 1866; 15 single puddling furnaces, 3 heating furnaces, 3 trains of rolls (18-inch muck, 16-inch bar, and 8-inch guide); product, bridge and bar iron and stay-bolt iron; annual capacity, 7,500 net tons. W. C. DePauw, President; Peter R. Stoy, Vice-President, Treasurer, and General Manager; Edward B. Stoy, Secretary.
- Terre Haute Iron and Nail Works, Terre Haute, Vigo county. Built in 1868; destroyed by fire September 19, 1873, but rebuilt in the winter of 1873-4; enlarged in 1883 and 1884; 5 double and 16 single puddling furnaces, 2 scrap furnaces, 4 heating furnaces, 144 nail machines, and 2 trains of rolls; product, nails; use Coyne's picker; annual capacity, 400,000 kegs. Brands, "Terre Haute" and "Superior." F. Nippert, President; Sam. L. Bridwell, Secretary.
- Wabash Iron Company, Terre Haute, Vigo county. Completed in January, 1874; 15 single puddling furnaces, 1 scrap furnace, 3 heating furnaces, and 3 trains of rolls (one 8, one 18, and one 20-inch); product, all kinds of bar and guide iron, and light T rails; annual capacity, 10,000 net tons. Brand, "Wabash." A. J. Crawford, President; J. P. Crawford, Secretary and Treasurer.
- Number of rolling mills in Indiana: 8.

ILLINOIS.

- Belleville Nail Company, Belleville, St. Clair county. Part of this plant was built at St. Louis, Mo., by the Bogey Nail Works, and moved to Belleville, Ill., in 1869; works were completed in 1869-70; 1 single puddling furnace, 2 forge fires, 5 heating furnaces, 2 trains of rolls, and 80 nail machines; product, cut nails; annual capacity, 175,000 kegs.

James Waugh, President; W. W. Waugh, Vice-President; J. C. Waugh, Jr., Secretary; R. F. Waugh, Treasurer.

Calumet Iron and Steel Company, First National Bank Building, Chicago. Works at Cummings, Cook county. First put in operation in August, 1876; 24 double puddling furnaces, 2 scrap and 5 heating furnaces, 4 trains of rolls, and 132 nail machines; operated with the Siemens gas furnace; product, merchant bar iron and iron and steel nails; annual capacity, 20,000 net tons of bar iron and 300,000 kegs of nails; four open-hearth steel furnaces added in 1882. C. R. Cummings, President; D. C. Bradley, Vice-President and General Manager; John M. Brown, Secretary and Treasurer. *See Furnaces.*

Centralia Iron and Nail Works, Centralia, Marion county. Built in 1878, and put in operation in March, 1879; 12 single puddling furnaces, 2 heating furnaces, 50 nail machines, and 2 trains of rolls; product, nails; annual capacity, 140,000 kegs. S. M. Warner, President; E. S. Condit, Vice-President; A. D. Bailey, Secretary; F. Kohl, Treasurer; M. H. Monkhouse, Superintendent.

Chicago Splice-Bar Mill, Morris Sellers & Co., 6 Ashland Block, Chicago. Built in 1878; 1 forge fire, 2 heating furnaces, and 2 trains of rolls; product, "Samson" splice bars; annual capacity, 6,000 net tons. Howard Greer, Superintendent.

Chicago Steel Works, 806 Noble st., Chicago. Built in 1873; 9 heating furnaces, 3 forge fires, and 2 trains of rolls; manipulate Bessemer steel rail ends; product, tires, plow beams, harrow teeth, springs, toe-calk steel, and squares and rounds; annual capacity, 6,000 net tons. C. P. Buckingham, President; E. Buckingham, Treasurer; J. H. Buckingham, Secretary; E. H. Buckingham, Superintendent.

Chicago Tyre and Spring Works, 123 Dearborn st., Chicago. Works at Melrose, Cook county. Rolling mill built in 1881-2; 1 heating furnace and 1 train of tire rolls; product, steel locomotive tires, made from imported blooms. Spring works have furnaces, rolls, and machinery for railroad springs. F. M. Atkinson, President.

Fowler Rolling Mill, Fowler Rolling Mill Company, 142 Dearborn st., Chicago. Built in 1882; 1 forge fire, 2 heating furnaces, one 9-inch train of rolls; product, "Fowler" spikes; annual capacity, 8,000 net tons. Sidney A. Kent, President; Wm. J. Watson, Vice-President; H. W. Fowler, Secretary, Treasurer, and General Manager.

Joliet Steel Works, Joliet Steel Company, Honore Building, Chicago. Works at Joliet, Will county. Built in 1870; steel works made first blow January 26, 1873, and the first steel rail March 15, 1873; the converting department has two 8-gross-ton converters, one double vertical non-condensing engine by I. P. Morris, one double vertical condensing engine with Reynolds-Corliss valve motion by E. P. Allis & Co., 10 tubular boilers, and 2 Worthington pressure pumps; annual capacity, 160,000 net tons of steel ingots. Steel rail mill A has 8 single Siemens heating furnaces, 20 gas producers, 31½-inch blooming train, 23-inch rail train, 2 vertical condensing Corliss engines, 14 tubular

boilers, shears, and a Sellers 3-ton hammer; annual capacity, 126,500 net tons of steel rails. Steel rail mill B has 11 draft heating furnaces, 3-high 21-inch rolls, and 15 boilers; annual capacity, 110,000 net tons of steel rails. Bar mill has one 10 and one 21-inch train of rolls, 3 draft heating furnaces, and complete appliances for making merchant steel; annual capacity, 7,000 net tons. Alex. J. Leith, President, New York City; W. R. Stirling, Treasurer, Chicago; H. S. Smith, General Superintendent, Joliet. *See Furnaces.*

Kewanee Rolling and Pipe Mill Company, Kewanee, Henry county. Built in 1883, and put in operation in November, 1883; 3 double-double puddling furnaces, 2 heating furnaces, two 16-inch trains of rolls, and one 5,000-lb. hammer; product, skelp iron, used by the company in the manufacture of steam-heater pipe; annual capacity, 15,000 net tons. W. E. Haxtum, President; J. H. Pierce, Secretary and Treasurer.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, and 37 Mitchell Block, Milwaukee, Wis. Two plants in Illinois, known as the Chicago Works and the South Chicago Works. Chicago Works located at Chicago, on the north branch of the Chicago river, at the foot of Waubansia avenue, built in 1857; 1 sextuple and 8 quadruple puddling furnaces, equal to 38 single furnaces, 23 heating furnaces, 10 trains of rolls, and 1 hammer; Bessemer steel works have two 6-gross-ton converters and all the appliances for making rails; made their first blow April 10, 1872; product, Bessemer steel ingots and iron and Bessemer steel rails; annual capacity, 130,000 net tons steel rails and 60,000 tons iron rails. South Chicago Works, E. C. Potter, Superintendent, located at South Chicago, made their first blow June 14, 1882; contain three 10-gross-ton Bessemer converters, 4 Siemens heating furnaces, one 3-high 40-inch blooming train, and one 2-high reversing finishing train of rolls; product, Bessemer steel rails; estimated annual capacity, 225,000 net tons. All rails branded with the company's initials. This company has in operation 4 rail mills, 1 merchant mill, and 8 blast furnaces. O. W. Potter, President, Chicago; N. Thayer, Vice-President, Boston, Mass.; S. Clement, Treasurer, Milwaukee, Wis.; R. C. Hannah, Secretary, Chicago; John C. Parkes, General Manager. General office, Chicago. *For details in addition to this description see Illinois Furnaces and Wisconsin Furnaces and Rolling Mills.*

Pullman Iron and Steel Company, Pullman, Cook county. Built in 1883-4; 2 forge fires, 8 Swindell gas heating furnaces, one 18 and one 10-inch train of rolls, and one 3-ton steam hammer; product, "Bayonet" railroad spikes; annual capacity, 25,000 net tons. L. M. Johnson, President; W. E. Barrows, Vice-President; Frank B. Felt, Secretary and Treasurer; James P. Perkins, General Manager.

Springfield Iron Company's Iron and Steel Works, Springfield Iron Company, Springfield, Sangamon county. Chicago office, 175 Dearborn st. Puddle mill first put in operation in June, 1872; 8 double

puddling furnaces; 1 train of 2 stands of 18-inch rolls, squeezer attached, driven by a 28 x 60-inch Corliss engine. Rail mill put in operation in September, 1872; 6 Siemens gas heating furnaces, 20 gas producers; one 23-inch train of rolls with 3 stands, driven by a vertical engine 40 in. diameter by 36 in. stroke; product, steel and iron rails; annual capacity, 60,000 net tons; this mill is at present idle, owing to condition of trade. Bar mill put in operation in November, 1878; 4 Siemens gas heating furnaces; one 16-inch train of rolls, driven by a vertical Corliss engine, 29 x 39 inches, and one 12-inch train, driven by a 20 x 30-inch Hartford Buckeye engine; product, bar iron, fish-plates, and merchant steel; annual capacity, 20,000 net tons. Twenty-two-inch plate mill, with two stands of rolls for making light steel sheets and plates for agricultural implements and for other purposes, put in operation in January, 1883; annual capacity, 9,000 net tons; attached to this mill is a full plant of shears for cutting up plates to any desired patterns. Boiler plate mill put in operation in August, 1884; one 31-inch train of rolls, 112 inches in length, with tilting tables on each side, driven by a Porter-Allen engine, 44 x 48 inches; also fitted with cooling tables, shears, hydraulic cranes, etc., and prepared to turn out steel plates of any size up to 108 inches in width; this mill is fitted up with Siemens gas heating furnaces. Steel-melting house contains two 20-gross-ton Siemens-Pernot open-hearth steel-melting furnaces, built in 1879; made the first steel ingot February 9, 1880; 1 Pernot furnace and 2 cupolas for dephosphorizing pig metal by the Krupp process; 12 gas producers; annual capacity, 20,000 net tons. Blooming mill contains a stand of 30½-inch rolls, built in 1879, with hydraulic tables attached; 2 Siemens heating furnaces, with power fixtures for charging and drawing; shears for cutting blooms; blooming train run by a 32 x 60-inch Corliss engine; 16 gas producers supply the furnaces in both bar and blooming mills. Charles Ridgely, President; John W. Bunn, Vice-President; Geo. M. Brinkerhoff, Secretary; Franklin Ridgely, Assistant Secretary; John E. Fry, Manager.

Tudor Iron Works, St. Louis Bolt and Iron Company, Third and St. Charles sts., St. Louis, Mo. Works at East St. Louis, St. Clair county, Ill. Put in operation in January, 1873; 1 single and 1 double puddling furnace, 1 scrap furnace, 8 heating furnaces, 4 trains of rolls, (one 8, one 9, and two 16-inch,) 6 spike machines, 2 bolt headers, 4 bolt cutters, 2 nut tappers, and 1 nut machine; reroll Bessemer steel; product, bar iron, light T and street rails, angles, iron fish-plates, bolts, washers, and spikes, and Bessemer steel tires, fish-plates, etc. Brand of spikes, "Tudor." T. A. Meysenburg, President; Wm. E. Guy, Vice-President and Secretary; Geo. S. Edgell, Treasurer.

Union Steel Company, 38 Portland Block, Chicago. Built in 1863; 2 heating furnaces, 1 train of flat rolls, 1 rail train, and a blooming train for steel ingots; the Bessemer steel works have two 6-gross-ton converters, 4 cupolas, and 2 spiegel-melting furnaces; made their first blow July 26, 1871; product, Bessemer steel rails; total annual ca-

capacity, 65,000 net tons. Henry H. Porter, President; M. A. Farr, Secretary; C. W. Hillard, Treasurer. *See Furnaces.*

Western Nail Company, Belleville, St. Clair county. Built in 1882-3; 3 blooming furnaces, 2 heating furnaces, one 21-inch slabbing train of rolls, one 19-inch nail-plate train of rolls, and 150 nail machines; product, cut nails; annual capacity, 400,000 kegs. W. H. Powell, President and General Manager; Conrad Rienecke, Vice-President; H. L. Powell, Secretary; E. B. Powell, Superintendent of works.

Western Steel Company, 58 Dearborn st., Chicago. Works at Parkside, Cook county. Built in 1881; 4 heating furnaces, 1 train of rolls, and 2 hammers; product, "Seymour" rolled steel horse shoes; annual capacity, 1,500 net tons. James D. Sturges, President; J. W. Helmer, Secretary and Treasurer; J. C. Blewett, Superintendent; George R. French, General Agent.

Number of rolling mills and steel works in Illinois: 17. Of these 4 make Bessemer steel, and 2 make open-hearth steel.

MISSOURI.

Granite Iron Rolling Mills, St. Louis Stamping Company, Cass avenue and Second st., St. Louis. Built in 1879; 3 puddling furnaces, 2 Siemens and 2 coal heating furnaces, 10 charcoal knobbling fires, 3 trains of rolls, and 3 hammers; product, stamping sheet iron for "granite iron ware" and galvanizing sheet; annual capacity, 5,000 net tons. F. G. Niedringhaus, President; Wm. F. Niedringhaus, Secretary and Manager.

Harrison Wire Works, Harrison Wire Company, 816 High st., St. Louis. Built and started in 1873; one 2½-ton steam hammer, 5 heating furnaces, one 2-high 18-inch train of rolls, one rod train, and 4 engines; daily capacity of rolling mill, 40 net tons of rods, but not now in operation. Wire department has 350 blocks and 3 engines; daily capacity, 100 net tons of wire. Annealing and galvanizing departments attached; daily capacity of galvanizing department, 50 net tons. Edwin Harrison, President; Charles Miller, Treasurer; A. A. Lasar, Secretary.

Helmbacher Forge and Rolling Mills Company, Allen Building, corner Broadway and Market sts., St. Louis. Works, South Second st., between Lami and Barton sts. Built in 1858; 7 single puddling furnaces, 10 heating furnaces, 2 trains of rolls, (one 9 and one 10-inch,) and 11 hammers (one 8-ton double-acting); product, bar, rod, band, and angle iron, car-axles, links, pins, light T rails from 8 to 20 lbs., and all kinds of light and heavy iron and steel forgings for railroad and steamboat use, and for machine shops; specialties, iron and steel forgings, railroad car-axles, links, and pins; annual capacity, 12,000 net tons. M. Helmbacher, President and Treasurer; A. Helmbacher, Vice-President and Superintendent; G. L. Goetz, Secretary; George H. Cole, General Agent.

Laclede Rolling Mill, Chouteau, Harrison & Vallé Iron Company, 941 North Second st., St. Louis. Built in 1850; rebuilt in 1879; 20 single puddling furnaces, 5 Siemens and 3 coal heating furnaces, 1 scrap furnace, 6 knobbling fires, 6 trains of rolls, 2 hammers, 2 bolt headers, 2 spike machines, 5 screw cutters, 2 machines for making washers, 1 nut machine, and 2 nut tappers; product, bar, sheet, and plate iron, plate and sheet steel, blooms, angle and tee iron, 8 to 25-lb. T rails, 20 to 50-lb. flat rails, spikes, nuts, bolts, and washers; also cold-rolled sheet iron; annual capacity, 20,000 net tons. C. C. Maffitt, President; Edwin Harrison, Vice-President; Paul A. Fusz, Secretary.

McKenney Tubular Rail Company, La Grange, Lewis county. Office at Chicago, Illinois. Built in 1883; puddle mill contains 2 Siemens gas puddling furnaces and one 22-inch train of rolls; rail mill contains one 16-inch and one 22-inch train of rolls and 2 Siemens double heating furnaces; product, patent tubular rails.

St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer Building, corner Broadway and Locust sts., St. Louis. Works at South St. Louis. Built in 1872 as an iron mill; Bessemer steel works erected in 1875-6, made their first blow September 1, 1876; two 7-gross-ton converters, 3 pig-iron cupolas, 40 x 8, 4 spiegel-melting furnaces, 40 x 5, two 12-ton cupola ladles, 12 gas producers, 7 Siemens heating furnaces, one 3-ton hammer, one 33-inch blooming train, one 24-inch rail train, and one 22-inch billet train; product, Bessemer steel rails and billets. *See Furnaces.*

St. Louis Steam Forge and Iron Works, A. McDonald & Brother, corner Main and Miller sts., St. Louis. Built in 1862; 2 double puddling furnaces, 3 forge fires, 8 heating furnaces, 2 trains of rolls, (one 8 and one 18-inch,) and 6 hammers; product, car-axes and forgings.

Number of rolling mills and steel works in Missouri: 7. Of these 1 makes Bessemer steel.

IOWA.

Burlington Rolling Mill Company, Burlington, Des Moines county. Built in 1884, and put in operation early in October, 1884; heating furnaces and one 3-high 18-inch train of rolls; product, all sizes of merchant bar iron. John H. Gear, President; G. R. Henry, Vice-President; John G. Foote, Secretary and Treasurer; M. S. Foote, General Manager.

Number of rolling mills in Iowa: 1.

MICHIGAN.

Baugh Steam Forge Company, No. 1 Newberry and McMillan Building, Detroit, Wayne county. Works at Springwells, about three miles west of Detroit. Forge built in 1870, rolling mill in 1877, puddle mill in 1879; 1 Siemens and 9 reverberatory heating furnaces, 2 double-double and 2 single-double puddling furnaces, 5 hammers, and 3 trains

of rolls (one 9-inch guide, one 16-inch bar, and one 20-inch muck); product, car-axles, links, and pins, shafting, and bar iron. James McMillan, President; Hugh McMillan, Vice-President; John B. Baugh, General Manager; Samuel A. Baugh, Superintendent; W. K. Anderson, Treasurer; R. D. Field, Secretary.

Detroit Steel and Spring Works, First and Larned sts., Detroit. First put in operation in May, 1882; 7 Swindell and 4 double Weber heating furnaces, 2 trains of rolls, (one 18 and one 9-inch,) and 8 hammers; product, steel shapes, rolled from purchased steel; annual capacity, 8,000 net tons. Crucible steel department added in 1884; first steel made in February, 1884; one Siemens gas pot furnace and six steel-melting holes; 30 pots can be used at each heat in steel works; product, tools and springs; annual capacity, 1,500 net tons. Alexander De Lano, President; Charles P. Choate, Vice-President; H. R. Newberry, Secretary and Treasurer.

Eureka Iron and Steel Works, No. 21 Newberry and McMillan Building, Detroit. Works at Wyandotte, Wayne county. Built in 1855; 7 double and 7 single puddling furnaces, 14 forge fires, 13 heating furnaces, 7 trains of rolls, (one 30, three 24, one 20, one 18, and one 8-inch,) and 1 hammer; product, "Wyandotte" boiler plate and tank iron, and bars; annual capacity, 30,000 net tons. Formerly called Wyandotte Rolling Mills. W. K. Muir, President, Detroit; S. D. Miller, Vice-President, Detroit; W. S. Armitage, Secretary and Treasurer, Detroit; J. S. Van Alstyne, Agent, Wyandotte; W. H. Brazier, Superintendent. *See Furnaces.*

Number of rolling mills in Michigan: 3, of which 1 is a crucible steel works.

WISCONSIN.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago, Ill., and 37 Mitchell Block, Milwaukee, Wis. Milwaukee Works at Bay View, near Milwaukee, Milwaukee county. Built in 1868 and 1874; 7 quadruple and 2 double puddling furnaces, 21 coal and 5 Siemens heating furnaces, 7 trains of rolls, and 1 hammer; product, rails, merchant bar iron, fish-plates, car links and pins, and horse shoes; annual capacity, 60,000 net tons of rails, 40,000 tons merchant bar iron, and 20,000 tons fish-plates, etc. Nail mill added in 1884; 100 nail machines; annual capacity, 250,000 kegs. *See Furnaces. See Illinois Furnaces and Rolling Mills.*

Number of rolling mills in Wisconsin: 1.

MINNESOTA.

Standard Iron Works, Strothman Brothers, Minneapolis, Hennepin county. Built in 1884, and first put in operation in August, 1884; 2 heating furnaces and 1 train of rolls; product, flat, round, and square bar iron; annual capacity, 1,500 net tons.

Number of rolling mills in Minnesota: 1.

KANSAS.

Kansas Rolling Mill Company, Kansas City, Missouri. Works at Rosedale, Wyandotte county, Kansas, 3 miles from Kansas City; composed of the plant that was formerly at Decatur, Illinois, having been removed and rebuilt in 1875; it was first erected in 1870; has 11 heating furnaces, 2 hammers, 6 spike machines, and 3 trains of rolls, (one 9, one 18, and one 20-inch,) and a set of "universal" rolls attached to the 20-inch train; product, iron rails, fish-plates, bolts, nuts, spikes, merchant bar iron, etc.; annual capacity, 35,000 net tons.

Number of rolling mills in Kansas: 1.

NEBRASKA.

Omaha Nail Works, Omaha Nail Manufacturing Company, Omaha, Douglas county. Built in 1879; 2 heating furnaces, 3 trains of 20-inch rolls, and 32 nail machines; product, nails; use scrap iron and old rails only; annual capacity, 110,000 kegs. W. A. Paxton, President; James Creighton, Vice-President; John W. Lauer, Secretary and Treasurer.

Number of rolling mills in Nebraska: 1.

COLORADO.

Colorado Coal and Iron Company, South Pueblo, Pueblo county. Works at Denver, Arapahoe county, and at South Pueblo, Pueblo county. The works at Denver consist of a rolling mill purchased of the Denver Rolling Mill Company in 1880, having been built in 1878; 5 heating furnaces and 2 trains of rolls; product, bar iron, iron rails, and splice bars; annual capacity, 12,000 net tons. The works at South Pueblo consist of Bessemer steel works, steel rail mill, puddle mill, and nail factory; these works were built in 1881-2, and the converting department made its first blow April 11, 1882; two 5-gross-ton Bessemer steel converters, with blowing apparatus, etc., 4 Siemens heating furnaces, one 3-high 35-inch blooming train, one 3-high 23-inch rail train, 3 Siemens double-double puddling furnaces, one 3-high 20-inch muck and one 2-high 22-inch nail-plate train, heating and annealing furnaces, 27 nail machines, and railroad spike and bolt and nut machines; product, steel rails, iron cut nails, railroad spikes, bolts, and nuts; annual capacity, 50,000 net tons of steel rails, 100,000 kegs of nails, and 30,000 kegs of railroad spikes, bolts, and nuts. The company has purchased and removed to South Pueblo the merchant bar mill and 22-inch train of rolls formerly belonging to the Ogden Iron Works, at Ogden, Utah Territory. Henry E. Sprague, President, New York City; A. H. Danforth, Vice-President and General Manager, South Pueblo; W. L. Graham, Secretary and Treasurer, South Pueblo; W. G. Brown, Sales Agent, Denver; D. N. Jones, General Superintendent of steel works, South Pueblo. *See Furnaces in Utah and Colorado.*

Number of rolling mills, and steel works in Colorado: 2. Both of these make rails and 1 makes Bessemer steel.

WYOMING TERRITORY.

Union Pacific Rolling Mills, Union Pacific Railroad Company, Laramie City, Albany county. Built in 1874-5; put in operation in April, 1875; 10 heating furnaces and 2 trains of rolls, (one 10 and one 19-inch,) and 1 hammer; product, rails, bar iron, nuts, bolts, spikes, and splice bars; annual capacity, 22,000 net tons. F. E. Scrymiser, Superintendent.

Number of rolling mills in Wyoming Territory: 1.

CALIFORNIA.

Central Pacific Railroad Rolling Mill, Central Pacific Railroad Company, Sacramento, Sacramento county. Built in 1881; 9 heating furnaces, 3 trains of rolls, and 7 hammers; product, all kinds of bar and shaped iron; annual capacity, 8,000 net tons. Brand, "C. P. R. R." A. J. Stevens, General Manager of the mill.

Judson Manufacturing Company, Oakland, Alameda county. Built in 1882; 4 heating furnaces and two trains of rolls (one 10 and one 16-inch); product, bar iron and tack plate. Brand, "Judson." Egbert Judson, President; A. Chabot, Vice-President; C. B. Morgan, Secretary; First National Bank, Treasurer; C. S. Chamberlain, Superintendent. Sales are made by the San Francisco office.

Pacific Iron and Nail Company, 258 Market st., San Francisco. Works at Oakland, Alameda county. Built in 1882-3, and put in operation May 1, 1883; 3 forge fires, 4 heating furnaces, one train of 3-high 14-inch rolls, 72 nail machines, and 1 hammer; product, cut nails; annual capacity, 150,000 kegs. A. M. Starr, President; A. Harker, Vice-President; W. J. Houston, Secretary and Manager, San Francisco; Bank of British Columbia, Treasurer; A. Harris, Superintendent.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 16 First st., P. O. Box 2,032, San Francisco. Put in operation July 25, 1868; 4 single puddling furnaces, 17 heating furnaces, 5 trains of rolls, (one 8, one 10, and three 18-inch,) 3 spike and 2 rivet machines, 4 bolt headers, 1 pointer, 3 hot-press nut machines, 10 punching and straightening presses, 8 steam hammers, and 2 belt hammers; product, bar iron, angle iron, shafting, 12 to 60-lb. iron and steel rails, railroad, ship, and boat spikes, bridge work, bolts, (all kinds except carriage,) nuts, washers, boiler rivets, horse-shoe shapes, car-axles, and all kinds of railroad and ship forgings; steel rails made from purchased blooms; total annual capacity, 30,000 net tons. Open-hearth steel department added in 1884; one Siemens-Martin open-hearth furnace, with a daily capacity of 30 tons; first steel made July 15, 1884; product, structural shapes, forgings, castings, etc. Wm. Alvord, President; L. B. Benchley, General Manager; C. M. Keeney, Secretary; Patrick Noble, Superintendent.

Number of rolling mills in California: 4, of which 1 makes open-hearth steel.

PROJECTED.

Union Iron Works, San Francisco. Proposes erecting a rolling mill for the production of iron and steel ship-plates.

Steel works projected at Martinez, Contra Costa county.

UNITED STATES.

Total number of rolling mills and steel works in the United States: 434 completed, and 4 building. Of these 35 make open-hearth steel, and 3 open-hearth works are building; 41 make crucible steel; 21 make Bessemer steel, and 1 Bessemer steel plant is building; 3 make cemented steel; and 2 make patent steels.

RECENTLY ABANDONED ROLLING MILLS.

MASSACHUSETTS.

Dighton Rolling Mill, Dighton Rolling Mill Company, Dighton, Bristol county. Built in 1866; destroyed by fire in 1869, and not rebuilt.

New England Iron Company, Readville, Norfolk county. Built in 1862; product, bar iron, gas plates, and shapes.

Newton Iron Works, Newton Upper Falls, Middlesex county. Built about 1800; product, bar and rod iron; not in operation for several years, and abandoned in 1880.

RHODE ISLAND.

Providence Iron Company, Providence. Built in 1845; abandoned in 1880.

CONNECTICUT.

Hunt Canfield Iron Company, Huntsville, Litchfield county. Destroyed by fire, and not rebuilt.

NEW YORK.

Buffalo Iron and Nail Works, Buffalo, Erie county. Built in 1847; abandoned in 1880.

Delano Iron Works, Syracuse, Onondaga county. Built in 1865; product, rails, fish-plates, railroad spikes, and merchant iron. Dismantled in 1878.

Lake Champlain Nail Works, Dannemora, Clinton county. Built in 1853; abandoned in 1877.

Napanoch Rolling Mill, Napanoch Rolling Mill Company, Napanoch,

- Ulster county. Originally a forge; converted into a rolling mill; started up in February, 1880, after 8 years' idleness. Idle since May, 1881, and dismantled.
- New York Steam Forge, West Sixteenth st., New York City. Built in 1880; removed to Milton, Pa., in 1883.
- Peru Steel and Iron Company, Clintonville, Clinton county. Built in 1824; 2 heating furnaces and 3 trains of rolls; abandoned.
- Plattsburgh Iron Works, Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Rolling mill built in 1878; converted into a forge in 1883.
- Samsondale Iron Works, Haverstraw, Rockland county. Built in 1832. Removed to Duncansville, Pa., in 1884.
- Skaneateles Iron Works, Skaneateles Falls, Onondaga county. Built in 1868; abandoned in 1880.
- Suffern, James, Suffern P. O., Rockland county. Built in 1850; product, bars.
- Troy Wire Mills, Troy. One 6-inch mill built in 1874, but only used for a short time; dismantled.

NEW JERSEY.

- Bergen Iron Works, Jersey City. Built in 1852; product, plate iron and blooms. Dismantled in 1879.
- Camden Rolling Mill, Camden, Camden county. Annual capacity, 12,000 net tons of bar iron and 75,000 kegs of nails.
- Collier's Iron Works, William Collier, Paterson, Passaic county. Built in 1872; product, merchant bar and horse-shoe iron; annual capacity, 2,000 net tons.
- North River Rolling Mill, Alex. C. Durbin, Thirteenth and Henderson sts., Jersey City. Product, fire-box and boiler plate; annual capacity, 3,000 net tons. Torn down in 1875.

PENNSYLVANIA.

- Brady's Bend Iron Company, Brady's Bend, Armstrong county. Built in 1842; product, rails. Demolished in 1879.
- Colemanville Rolling Mill, Colemanville, Lancaster county. Burned in 1875.
- Danville Rolling Mill, Danville. Built in 1870; removed to Chester in 1881.
- Hibernia Forge and Rolling Mill, Wagontown, Chester county. Forge built in 1792; mill added in 1837; abandoned in 1880.
- Juniata Iron Works, S. & B. R. Hatfield, Alexandria, Huntingdon county. Built in 1838; product, sheet, plate, and bar iron. Burned in 1868.
- Mount Carbon Rolling Mill, Mount Carbon, Schuylkill county. Bar and plate mill. Burned in May, 1879.
- West Brandywine Iron Works, Coatesville, Chester county. Built in 1845; abandoned in 1880.

MARYLAND.

Baltimore Steam Forge and Rolling Mills, Trego, Thompson & Co., Baltimore. Built in 1853; product, bar iron and car-axles.

Mount Savage Iron Company, Mount Savage, Alleghany county. Built in 1839; product, rails. Abandoned for many years, and completely dismantled in 1875.

VIRGINIA.

Graham's Forge, Wythe county. Built in 1828; product, bar iron and nails. Abandoned in 1881.

NORTH CAROLINA.

Briggs's Rolling Mill, Gaston county. Built in 1853; has been standing idle for several years.

SOUTH CAROLINA.

Magnetic Iron Company, Limestone Springs P. O., Spartanburg county. Works on Proud river, Union county. F. G. Latham, Agent. Organized about 1840; rolling mill, nail works, forge, foundry, and 4 blast furnaces, each 36 feet high with 9-foot boshes; water-power; worked continuously from organization until 1871.

South Carolina Manufacturing Company, Spartanburg, Spartanburg county. Built in 1835; product, bar iron, blooms, and nails; annual capacity, 2,000 net tons. This mill and 2 blast furnaces belonging to the same establishment have not been in operation for several years.

GEORGIA.

Georgia Iron Works, Atlanta, Fulton county. Built in 1865-6; product, iron rails and bar iron. Burned September 21, 1881, and the machinery sold and removed.

Rome Iron Works, Empire Iron Company, Rome, Floyd county. Built in 1869; product, bar iron and nails. Dismantled in 1881.

KENTUCKY.

Covington Rail Mill, James G. Kyle & Bro., Covington, Kenton county. Built in 1854; product, rails. Torn down in 1878.

Louisville Iron and Steel Works, Clay st., Louisville. Built in 1869; 19 puddling furnaces, 1 scrap and 3 heating furnaces, one 18-inch forge mill with 2 pairs rolls and Burden squeezer, one 12-inch 3-high bar mill, and one 8-inch 3-high guide mill. Formerly called Kentucky Rolling Mill. Idle for a number of years.

TENNESSEE.

Memphis Rolling Mill, James Tranter, of Cincinnati, Ohio. Mill at

Memphis, Shelby county. Built in 1866; product, merchant bar, plow slabs, fish bars, and street rails; annual capacity, 5,000 net tons. Dismantled in 1879.

OHIO.

Alliance Rolling Mill, Alliance, Stark county. Built in 1867; product, rails. Dismantled in 1878.

Ashtabula Rolling Mill, Ashtabula, Ashtabula county. Built in 1873-4; product, boiler plate, sheet iron, shingle bands, washers, and wrought spikes. Torn down in 1879.

Leetonia Nail and Bolt Company, Leetonia, Columbiana county. 26 nail machines and train for making nail plate; no puddling furnaces; annual capacity, 2,600 net tons. H. F. Christy, Agent.

Newark Rolling Mill, Newark, Licking county. Built in 1868 to roll rails; changed to a bar mill in 1875; abandoned and dismantled in 1879.

Pioneer Rolling Mill, Irondale, Jefferson county. Muck bar mill. Not in use for several years.

Valley Iron Company, Cleveland. Built in 1874-5; product, bar iron. Abandoned in 1880.

INDIANA.

Capital City Iron Works, Indianapolis. Product, bar iron. Not in operation for several years.

Evansville Rolling Mill, Evansville. Built in 1872; product, rails. Not in operation for several years.

Western Iron Company, Knightsville, Clay county. Built in 1868; product, muck bar. Torn down in 1879.

ILLINOIS.

Chicago Plate and Bar Mill, J. M. Ayer, 72 Washington st., Chicago. Product, plate and bar iron. Not in operation for several years.

East St. Louis Rail Mill, East St. Louis, St. Clair county. Built in 1865 to make rails. Destroyed by fire in 1879.

Northwestern Nail Works, Dunleith. Built in 1875-6; product, nails; removed to Omaha in 1879.

MICHIGAN.

Jackson Iron Manufacturing Company, Jackson county. Built in 1872. Torn down in 1879. Machinery removed to Springfield Iron Company's mill, Springfield, Ill.

Marquette Rolling Mill, Marquette and Pacific Rolling Mill Company, Marquette, Marquette county. Built in 1871; product, bar iron. Idle since 1875, and almost totally demolished.

MISSOURI.

Tudor Iron Works, St. Louis. Built in 1870; product, railroad spikes.

KANSAS.

Topeka Rolling Mill, Topeka. Built in 1874; product, rails. Burned in 1881.

UTAH TERRITORY.

Ogden Iron Works, Ogden. Begun in 1875, and completed in 1882. Removed to South Pueblo, Col., in 1884.

RECENTLY ABANDONED STEEL WORKS.

American Cast Steel Company, Cleveland, Ohio. Built in 1878 to make steel by the Bechtold patent.

Atlantic Steel Works, Richardson, Boynton & Co., 232 Water st., New York. Abandoned the manufacture of steel in 1875.

Calumet Tool Company, Chicago. Steel works built in 1879; one 12-pot Siemens steel-melting furnace, two 4-pot steel-melting holes, 2 steel-cementing furnaces, 4 heating furnaces, and 7 hammers; 20 pots can be used at each heat. Abandoned.

Chicago Sheffield Steel Works, 149 Fulton st., Chicago. Built in 1874-5; 2 heating furnaces, 2 hammers, and 4 steel-melting holes; product, tool and machinery steel; annual capacity, 300 net tons.

Cleveland Cast Steel Works, H. W. Foote, 145 Superior st., Cleveland, Ohio. Built in 1877 to make steel castings.

Crucible Cast Steel Casting Company Limited, Pittsburgh. Built in 1875; 3 steel-cementing furnaces and 8 steel-melting holes; product, steel castings; annual capacity, 600 net tons.

Estate of G. F. Wilson. Halsey J. Boardman, Boston, Mass., and Ellery H. Wilson, Rumford, R. I., trustees. One 6-gross-ton Siemens open-hearth steel furnace at Providence. Not in operation for several years.

North River Steel Works, Thirteenth and Henderson sts., Jersey City, New Jersey. Built in 1875; 24 melting holes and 2 trains of rolls; product, cast steel.

Pittsburgh Steel Works, Ross st. and First avenue, Pittsburgh. Built in 1845; five 24-pot Siemens furnaces, 3 sets of coke-hole furnaces, and 6 converting furnaces; 150 pots. Dismantled

Read & Thaw, North and Irwin avenues, Allegheny City, Pa. Built in 1878; 6 melting holes and 3 hammers; product, steel castings.

Wheeling Steel Works, Martin's Ferry, Ohio. Built in 1873-4; 12 steel-melting holes, 2 heating furnaces, and 2 hammers; product, tool cast steel. Torn down.

RAIL MILLS.

NOTE.—This list includes all rolling mills in the United States which make light and heavy sections of railroad bars and street rails. For a complete description of the works enumerated below see the preceding list of rolling mills. Nearly all the iron T rails now rolled are of light sections.

MASSACHUSETTS—1.

Worcester Steel Works, Worcester. Bessemer steel rails.

NEW YORK—3.

Albany and Rensselaer Iron and Steel Company, Troy, Rensselaer county. Iron and Bessemer steel rails.

Spuyten Duyvil Rolling Mill, Welch & Barnum, Spuyten Duyvil, New York City. Iron rails. Idle.

Union Iron Works, Union Iron Company of Buffalo, Buffalo. Idle.

PENNSYLVANIA—EASTERN DISTRICT—6.

Allentown Rolling Mills, 237 South Third st., Philadelphia. Works at Allentown, Lehigh county. Light T and street rails.

Bethlehem Iron Company, Bethlehem, Northampton county. Iron and Bessemer steel rails.

Palo Alto Rolling Mill, estate of Benjamin Haywood, deceased, Pottsville, Schuylkill county. Idle for the past four years.

Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Company, W. E. C. Coxe, Superintendent, Reading, Berks county. Iron rails; also Bessemer steel rails from purchased blooms.

Phoenix Iron Works, Phoenix Iron Company, Phoenixville, Chester county. Office, 410 Walnut st., Philadelphia.

Schuylkill Haven Rolling Mill, Schuylkill Haven Iron Company, Pottsville. Works at Schuylkill Haven, Schuylkill county. Light rails.

PENNSYLVANIA—CENTRAL DISTRICT—7.

Glendower Iron Works, Danville. T and street rails. Idle.

Green Ridge Iron Works, A. L. Spencer, Scranton. Light rails.

Lackawanna Iron and Steel Works, Lackawanna Iron and Coal Company, Scranton, Lackawanna county. Iron and Bessemer steel rails.

Lochiel Rolling Mill, J. D. Cameron, owner, Harrisburg. Idle.

Montour Iron and Steel Works, Montour Iron and Steel Company, Danville. Philadelphia office, 208 South Fourth st.

Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton, Dauphin county. Office, 208 South Fourth st., Philadelphia. Bessemer steel rails of all kinds.

Scranton Steel Company, Scranton. Bessemer steel rails.

PENNSYLVANIA—WESTERN DISTRICT—10.

Allegheny, Monongahela, and Birmingham Iron Works, Oliver Brothers & Phillips, Pittsburgh. Light rails.
Cambria Iron Company, Johnstown, Cambria county. Office, 218 South Fourth st., Philadelphia. Iron and Bessemer steel rails.
Edgar Thomson Steel Works, Carnegie Bros. & Co. Limited, Pittsburgh. Bessemer steel rails.
Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. Light rails.
Kensington Iron Works, H. Lloyd, Son & Co., Pittsburgh. Light rails.
Pittsburgh Bessemer Steel Company Limited, Pittsburgh. Bessemer steel rails.
Sharon Iron Company, Sharon, Mercer county. Light rails.
Shenango Iron Works, New Castle, Lawrence county. Light rails.
Sligo Rolling Mills, Phillips, Nimick & Co., Pittsburgh. Light rails.
Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Light rails.

MARYLAND—2.

Abbott Iron Works, Abbott Iron Company, Baltimore.
Cumberland Rolling Mill, Baltimore and Ohio Railroad Company, Cumberland. Has made no rails for several years.

ALABAMA—1.

Birmingham Rolling Mill, Birmingham Rolling Mill Company, Birmingham. Light T and street rails.

TEXAS—1.

Houston Rolling Mills and Iron Company, Houston. Light T rails.

WEST VIRGINIA—1.

Riverside Iron Works, Wheeling. Light rails.

KENTUCKY—1.

Swift's Iron and Steel Works, Newport. Office, 26 West Third st., Cincinnati. Mine T and street rails.

TENNESSEE—3.

Knoxville Iron Company, Knoxville. Light rails.
Lookout Rolling Mill, Chattanooga. Light rails.
Roane Iron Company, Chattanooga. Iron and open-hearth steel rails.

OHIO—16.

Ætna Iron and Nail Company, Bridgeport. Light and street rails.
Akron Iron Works, Akron Iron Company, Akron. Light rails.
Alikanna Rolling Mill, Steubenville. Light rails. Idle.
Cincinnati Rolling Mill Company, Cincinnati. Idle.
Cleveland Rolling Mill Company, Cleveland. Iron and Bessemer steel rails.

Columbus Iron Works, P. Hayden & Sons, Columbus. Light rails.
Columbus Rolling Mill, Columbus Rolling Mill Company, Columbus.
Iron rails; also Bessemer steel rails from purchased blooms.
Ironton Rolling Mill, New York and Ohio Iron and Steel Company,
Ironton, Lawrence county. Light rails.
Lawrence Iron Works Company, Ironton. Light rails.
Marietta Rail Mill, estate of Wm. Lottimer, Marietta. Not in operation
for several years.
Massillon Rolling Mill, Joseph Corns & Son, Massillon. Light rails.
Portsmouth Iron and Steel Works, John Means, trustee, Ashland, Ky.
Works at Portsmouth. Light rails. Idle.
Sandusky Rolling Mill, Sandusky, Erie county. Idle.
Trumbull Iron Company, Girard, Trumbull county. Light rails.
Union Iron Works, Union Rolling Mill Company, Cleveland. Light and
street rails.
Zanesville Iron Works, Ohio Iron Company, Zanesville. Light and
street rails.

INDIANA—4.

Central Iron and Steel Company, Brazil, Clay county. Light rails.
Indianapolis Rolling Mill, Indianapolis Rolling Mill Company, Indian-
apolis. Iron rails. Steel-rail mill not yet put in operation.
New Albany Rail Mill Company, New Albany.
Wabash Iron Company, Terre Haute.

ILLINOIS—5.

Joliet Steel Works, Joliet Steel Company, Joliet, Will county. Office,
Honore Building, Chicago. Bessemer steel rails.
North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago.
Iron and Bessemer steel rails.
Springfield Iron Company, Springfield, Sangamon county. Rail depart-
ment idle.
St. Louis Bolt and Iron Company, St. Louis, Mo. Works in St. Clair
county, Ill. Light and street rails.
Union Steel Company, 38 Portland Block, Chicago. Bessemer steel rails.

MISSOURI—4.

Helmbacher Forge and Rolling Mills Company, Allen Building, corner
Broadway and Market sts., St. Louis. Light rails.
Laclede Rolling Mill, Chouteau, Harrison & Vallé Iron Company, 941
North Second st., St. Louis. Light and flat rails.
McKenney Tubular Rail Company, La Grange. Office at Chicago.
St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer
Building, St. Louis. Bessemer steel rails.

WISCONSIN—1.

North Chicago Rolling Mill Company, Bay View. Offices, 17 Metro-
politan Block, Chicago, and 37 Mitchell Block, Milwaukee.

KANSAS—1.

Kansas Rolling Mill Company, Kansas City, Mo. Works at Rosedale. Idle.

COLORADO—2.

Colorado Coal and Iron Company, Denver and South Pueblo. Two rail mills. Iron and Bessemer steel rails.

WYOMING TERRITORY—1.

Union Pacific Rolling Mills, Union Pacific Railroad Company, Laramie City.

CALIFORNIA—1.

Pacific Rolling Mill and Forge, Pacific Rolling Mill Company, 16 First st., P. O. Box 2,032, San Francisco. Iron rails of all sizes; also Bessemer steel rails from purchased blooms.

UNITED STATES.

Total number of rail mills in the United States : 71.

NAIL MILLS.

NOTE.—This list includes all rolling mills in the United States which have nail machines. For a complete description of the works enumerated below see the preceding list of rolling mills.

MAINE—1.

Pembroke Iron Works, James C. Warr, Pembroke. Office, Wareham, Mass. 30 nail machines.

MASSACHUSETTS—12.

East Bridgewater Iron Company, Rogers & Sheldon, East Bridgewater. Office, 81 Water st., Boston. 26 nail machines.

Fall River Iron Works, Fall River Iron Works Company, Fall River. 105 nail machines.

Gosnold Mills, New Bedford. 10 nail machines.

Mount Hope Iron Works, Somerset. 65 nail machines.

Parker Mills, Bridgewater Iron Company, Wareham. Office at Bridgewater. 75 nail machines.

Reed Brothers' Rolling Mill, D. L. & F. S. Reed, Matfield. Office at Brockton. 30 nail machines.

Robinson Iron Company, Plymouth. 18 nail machines.

Somerset Iron Works, Old Colony Iron Company, Somerset. Office at Taunton. 70 nail machines.
Tisdale Nail Works, Wm. E. Coffin & Co., East Wareham. Office, 8 Oliver st., Boston. 80 nail machines. Idle for many years.
Tremont Nail Works, Tremont Nail Company, West Wareham. 75 nail machines.
Wareham Nail Company, South Wareham. 33 nail machines.
Weymouth Iron Company, East Weymouth. 82 nail machines.

NEW YORK—2.

Albany and Rensselaer Iron and Steel Company, Troy. 45 nail machines.
Sable Iron Works, J. & J. Rogers Iron Company, Ausable Forks. 10 nail machines. Nail department idle.

NEW JERSEY—3.

Boonton Iron Works, Boonton. 134 nail machines. Idle since 1876.
Cumberland Nail and Iron Company, Bridgeton. 84 nail machines.
Oxford Iron and Nail Company, Oxford. 103 nail machines.

PENNSYLVANIA—EASTERN DISTRICT—4 COMPLETED, 1 BUILDING.

Birdsboro Nail Works, E. and G. Brooke Iron Company, Birdsboro. 113 nail machines.
Ellis & Lessig's Steel and Iron Company Limited, Pottstown. Building a nail mill to contain 50 nail machines.
Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia. 38 nail machines.
Pottstown Iron Company, Pottstown. 95 nail machines.
Reading Iron Works, Reading. Office, 259 South Fourth st., Philadelphia. 28 nail machines.

PENNSYLVANIA—CENTRAL DISTRICT—15 COMPLETED, 1 BUILDING.

Bellefonte Iron and Nail Company Limited, Bellefonte. 30 nail machines.
Chesapeake Nail Works, Chas. L. Bailey & Co., Harrisburg. 103 nail machines.
Danville Nail Works, Danville Nail and Manufacturing Company, Danville. 41 nail machines.
Duncannon Iron Company, Duncannon. Office, 122 Race st., Philadelphia. 64 nail machines.
Harrisburg Nail Works, McCormick estate, Harrisburg. Works at Fairview, Cumberland county. 78 nail machines.
Hollidaysburg Iron and Nail Company, Hollidaysburg. 23 nail machines.
Johnson (Reuben) & Co., Northumberland. 50 nail machines.
Juniata Rolling Mill, Denniston, Porter & Landis, Hollidaysburg. 30 nail machines.

Lewisburg Nail Works, Lewisburg. Building a nail mill to contain 17 nail machines.

Milton Nail Works, C. A. Godcharles & Co., Milton. 75 nail machines.

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland. 37 nail machines; adding 3 nail machines.

Portage Iron Company Limited, Duncansville. 37 nail machines. Nail department idle.

Standard Nail and Iron Company, Williamsport. Works at Crescent. 17 nail machines.

Sunbury Nail Works, Sunbury Nail, Bar, and Guide Iron Manufacturing Company, Sunbury. 31 nail machines.

Towanda Nail Works, R. A. Bostley & Co., Towanda. 26 nail machines.

Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. 55 nail machines.

PENNSYLVANIA—WESTERN DISTRICT—11.

American Iron Works, Jones & Laughlins Limited, Pittsburgh. 63 nail machines.

Anchor Nail and Tack Works, Chess, Cook & Co., Pittsburgh. 96 nail machines.

Atlantic Iron and Nail Works, P. L. Kimberly & Co., Sharon. 40 nail machines.

Clinton Rolling Mill, Graff, Bennett & Co., Pittsburgh. 41 nail machines. Not operating nail department.

Etna Iron Works Limited, New Castle, Lawrence county. 55 nail machines.

Etna Iron Works, Spang, Chalfant & Co., Pittsburgh. Works at Etna, Allegheny county. 19 nail machines.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. 92 nail machines.

Sable Iron and Nail Works, Zug & Co., Pittsburgh. 59 nail machines.

Sharon Iron Company, Sharon. 64 nail machines.

Shenango Iron Works, New Castle, Lawrence county. 55 nail machines.

Vesuvius Iron and Nail Works, Moorhead, Brother & Co., Pittsburgh. 50 nail machines.

VIRGINIA—2.

Old Dominion Iron and Nail Works, Richmond. Works on Belle Isle. 100 nail machines.

Virginia Nail and Iron Works Company, Lynchburg. 25 nail machines.

ALABAMA—2.

Brierfield Coal and Iron Company, Brierfield. 72 nail machines.

Central Iron Works, Helena, Shelby county. 10 nail machines.

WEST VIRGINIA—6.

Belmont Nail Company, Wheeling. 151 nail machines.

Benwood Iron Works, Benwood, Marshall county. Office at Wheeling. 124 nail machines.

La Belle Iron Works, Wheeling. 122 nail machines.
Riverside Iron Works, Wheeling. 144 nail machines.
Standard Nail Works, Standard Nail and Iron Company, Clifton. 126 nail machines.
Top Mill, Wheeling Iron and Nail Company, Wheeling. 130 nail machines.

KENTUCKY—1.

Norton Iron Works, Ashland. 126 nail machines.

TENNESSEE—2.

Knoxville Iron Company, Knoxville. 41 nail machines.
South Tredegar Iron Company, Chattanooga. 74 nail machines.

OHIO—9.

Belfont Iron Works Company, Ironton. 126 nail machines.
Bellaire Nail Works, Bellaire. 124 nail machines.
Falcon Iron and Nail Works, Falcon Iron and Nail Company, Niles. 44 nail machines.
Jefferson Iron Works, Steubenville. 136 nail machines.
Junction Iron Company, Mingo Junction, Jefferson county. Office at Wheeling, W. Va. 126 nail machines.
Kelly Nail and Iron Company, Ironton. 100 nail machines.
Laughlin Nail Company, Martin's Ferry, Belmont county. Office at Wheeling, W. Va. 114 nail machines.
Mahoning Iron Works, Brown, Bonnell & Co., Fayette Brown, Receiver, Youngstown. 50 nail machines.
Spaulding Iron Company, Brilliant, Jefferson county. 76 nail machines.

INDIANA—3.

Cobb's Iron and Nail Company, Aurora. 42 nail machines; adding 8 nail machines.
Greencastle Iron and Nail Company, Greencastle. 45 nail machines.
Terre Haute Iron and Nail Works, Terre Haute. 144 nail machines.

ILLINOIS—4.

Belleville Nail Company, Belleville. 80 nail machines.
Calumet Iron and Steel Company, Cummings. Office at Chicago. 132 nail machines.
Centralia Iron and Nail Works, Centralia. 50 nail machines.
Western Nail Company, Belleville. 150 nail machines.

WISCONSIN—1.

North Chicago Rolling Mill Company, Bay View. Offices at Chicago and Milwaukee. 100 nail machines.

NEBRASKA—1.

Omaha Nail Works, Omaha Nail Manufacturing Company, Omaha. 32 nail machines.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo. 27 nail machines.

CALIFORNIA—1.

Pacific Iron and Nail Company, Oakland, Alameda county. Office at San Francisco. 72 nail machines.

UNITED STATES.

Total number of rolling mills containing nail machines: 81 completed, and 2 building. Number of nail machines: 5,695 in use, 67 being placed in new mills, and 11 being added to completed mills.

BESSEMER STEEL WORKS.

NOTE.—The ton used in giving the capacity of the converters is the ton of 2,240 pounds. For a full description of these works see the list of rolling mills.

MASSACHUSETTS—1.

Worcester Steel Works, Worcester. Two 4-ton converters. Made their first blow June 2, 1884.

NEW YORK—1.

Albany and Rensselaer Iron and Steel Company, Troy. Two 7-ton converters. Made its first blow February 15, 1865.

PENNSYLVANIA—9.

Bethlehem Iron Company, Bethlehem. Four 7-ton converters. Made its first blow October 4, 1873, and the first steel rail October 18, 1873.

Cambria Iron and Steel Works, Cambria Iron Company, Johnstown. Office, 218 South Fourth st., Philadelphia. Two 6½-ton converters. Made its first blow July 10, 1871.

Edgar Thomson Steel Works, Carnegie Brothers & Co. Limited, Bessemer Station, Allegheny county. Office at Pittsburgh. Three 10-ton converters. Made their first blow August 25, 1875, and the first steel rail September 1, 1875.

Lackawanna Iron and Steel Works, Lackawanna Iron and Steel Company, Scranton. Two 5-ton converters. Made its first blow October 23, 1875, and the first steel rail December 29, 1875.

Oliver Brothers & Phillips, Pittsburgh. One 2-ton Clapp-and-Griffith stationary converter. First blow made March 25, 1884. Building another converter of the same size.

Pennsylvania Steel Works, Pennsylvania Steel Company, Steelton P. O. Office, 208 South Fourth st., Philadelphia. Two 7-ton and three 8-ton converters. Made its first blow in June, 1867.

Pittsburgh Bessemer Steel Company Limited, Pittsburgh. Two 4-ton converters. Made its first blow March 19, 1881, and its first steel rail August 9, 1881.

Pittsburgh Steel Casting Company, Pittsburgh. One 5-ton converter. Made its first blow August 26, 1881.

Scranton Steel Company, Scranton. Two 4-ton converters. Made its first blow March 29, 1883, and its first steel rail May 4, 1883.

WEST VIRGINIA—1 COMPLETED AND 1 BUILDING.

Benwood Iron Works, Benwood. Building two 4-ton converters.

Riverside Iron Works, Wheeling. Two 5-ton converters. Made their first blow June 11, 1884.

OHIO—3.

Bellaire Nail Works, Bellaire. Two 4-ton converters. Made their first blow April 28, 1884.

Cleveland Rolling Mill Company, Cleveland. Two 10-ton converters. Made its first blow October 15, 1868.

Otis Iron and Steel Company, Cleveland. One 5-ton converter, built in 1884.

ILLINOIS—4.

Joliet Steel Works, Joliet Steel Company, Joliet. Office, Honore Building, Chicago. Two 8-ton converters. Made its first blow January 26, 1873, and the first steel rail March 15, 1873.

North Chicago Rolling Mill Company, 17 Metropolitan Block, Chicago. Two 6-ton converters. Made its first blow April 10, 1872.

North Chicago Rolling Mill Company, South Chicago. Office, 17 Metropolitan Block, Chicago. Three 10-ton converters. Made its first blow June 14, 1882.

Union Steel Company, 38 Portland Block, Chicago. Two 6-ton converters. Made its first blow July 26, 1871.

MISSOURI—1.

St. Louis Ore and Steel Company, E. A. Hitchcock, Receiver, Singer Building, St. Louis. Two 7-ton converters. Made its first blow September 1, 1876.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo. Two 5-ton converters. Made its first blow April 11, 1882.

UNITED STATES.

Total number of Bessemer steel works: 21 completed, and 1 building.
Number of converters: 46 completed, and 3 building. Total annual capacity of the completed works, 2,490,000 net tons of ingots.

CRUCIBLE CAST-STEEL WORKS.

NOTE.—These steel works are fully described in the list of rolling mills. Their capacity is here indicated by the number of pots which each works can use at one heat.

MASSACHUSETTS—2.

Joseph W. Howard Limited, corner Albany and Swett sts., Boston. 16 pots.

Washburn Car-wheel Company, Hartford, Conn. Steel works at Worcester. 48 pots.

CONNECTICUT—2.

Collins Company, Collinsville, Hartford county. 180 pots.

Farist Steel Works, Farist Steel Company, Bridgeport. 72 pots.

NEW YORK—4.

Chrome Steel Works, Kent avenue and Keap st., Brooklyn. 96 pots.

Johnson (Isaac G.) & Co., Spuyten Duyvil. 20 pots.

Monhagen Steel Works, Wheeler, Madden and Clemson Manufacturing Company, Middletown, Orange county. 96 pots.

Sanderson Brothers Steel Company, Syracuse. New York office, 11 Gold st. 64 pots.

NEW JERSEY—7.

Adirondac Steel Works, H. J. Hopper, Jersey City. 160 pots.

Heller & Brothers, Newark. 48 pots.

Jersey City Steel Works, Jersey City Steel Company, Jersey City. 320 pots.

Newark Steel Works, Benjamin Atha & Co., Newark. 144 pots.

Pompton Steel and Iron Company, Pompton, Passaic county. 160 pots.

West Bergen Steel Works, Spaulding & Jennings, West Bergen, Hudson county. 96 pots.

Woodside Steel Works, Belleville.

PENNSYLVANIA—20.

Beaver Falls Steel Works, Beaver Falls, Beaver county. 24 pots.

Black Diamond Steel Works, Park, Brother & Co., Pittsburgh. Decline to give information.

Burgess, Garrett & Co., Titusville, Crawford county. 12 pots.

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. 180 pots.

Crown Steel Works, McKeesport, Allegheny county. 24 pots.

Fairmount Steel Works, Alexander Foster & Co., 2325 Spring Garden st., Philadelphia. 24 pots.

Fort Pitt Iron and Steel Works, Graff, Bennett & Co., Pittsburgh. 60 pots.
Frankford Steel Works, Adam Tindel, Frankford P. O., Philadelphia. 40 pots.
Hussey, Binns & Co. Limited, Pittsburgh. 24 pots.
Hussey, Howe & Co. Limited, Pittsburgh. 204 pots.
Keystone Saw, Tool, Steel, and File Works, Henry Disston & Sons, Front and Laurel sts., Philadelphia. Steel works at Tacony, Philadelphia. 100 pots.
La Belle Steel Works, Smith, Sutton & Co., Pittsburgh. 120 pots.
Midvale Steel Company, Nicetown P. O., Philadelphia. 94 pots.
Nellis's Agricultural Works, A. J. Nellis Company, Pittsburgh. 20 pots.
Oxford Iron and Steel Works, William & Harvey Rowland, Frankford P. O., Philadelphia. 48 pots.
Pittsburgh Steel Casting Company, Pittsburgh. 72 pots.
Pittsburgh Steel Works, Chartiers, Allegheny county. Office, 107 Wood st., Pittsburgh. 130 pots.
Singer, Nimick & Co. Limited, Pittsburgh. 258 pots.
Standard Steel Casting Company, Thurlow, Delaware county. 18 pots.
Wayne Iron and Steel Works, Brown & Co., Pittsburgh. 192 pots.

MARYLAND—1.

Crown and Cumberland Steel Company, Cumberland. Office, Pittsburgh, Pa. 24 pots.

KENTUCKY—1.

Crucible Steel Casting and Metal Company, Louisville. 10 pots. Has been idle for some time.

TENNESSEE—1.

Southern Steel Works, Chattanooga. 4 pots.

OHIO—2.

Burgess Steel and Iron Works, Portsmouth, Scioto county. 24 pots.
Cleveland Steel Company, Cleveland. 32 pots.

MICHIGAN—1.

Detroit Steel and Spring Works, First and Larned sts., Detroit. 30 pots.

UNITED STATES.

Total number of crucible cast-steel works in the United States: 41.
Number of pots, 3,594.

OPEN-HEARTH STEEL WORKS.

NOTE.—These works are fully described in the list of rolling mills. The ton here used is the ton of 2,240 pounds.

NEW HAMPSHIRE—1.

Nashua Iron and Steel Company, Nashua. One 10-ton Siemens furnace.

VERMONT—1.

St. Albans Iron and Steel Works, St. Albans. One 10-ton Siemens furnace. Idle.

MASSACHUSETTS—2.

Bay State Iron Company, Boston. One 6-ton Siemens furnace. Not in operation for several years.

Norway Steel and Iron Company, 23 Mason Building, Boston. Three 10-ton Siemens furnaces.

NEW YORK—1.

Johnson (Isaac G.) & Co., Spuyten Duyvil. One 8-ton open-hearth furnace.

NEW JERSEY—1.

Newark Steel Works, Benjamin Atha & Co., Newark. One 7-ton Siemens furnace.

PENNSYLVANIA—17 COMPLETED AND 2 BUILDING.

Bethlehem Iron Company, Bethlehem. Building two 15-ton Siemens-Pernot furnaces.

Black Diamond Steel Works, Park, Brother & Co., Pittsburgh. Decline to give information.

Cambria Iron Company, Johnstown. Two 12-ton Siemens-Pernot furnaces.

Chester Rolling Mills, Chester. Two 15-ton Siemens furnaces.

Fort Pitt Foundry, Mackintosh, Hemphill & Co. Limited, Pittsburgh. Two 7-ton Siemens furnaces.

Frankford Steel Works, Adam Tindel, Frankford, Philadelphia. Building a 5-ton Siemens furnace.

Glenwood Steel Works, Leishman, Gordon & Snyder, Pittsburgh. One 5-ton Siemens furnace.

Grove, Grier & Co. Limited, Danville. Philadelphia office, 330 Walnut st. One 20-ton Siemens furnace.

Hussey, Howe & Co. Limited, Pittsburgh. One 7-ton Siemens furnace.

Juniata Iron and Steel Works, Shoenberger & Co., Pittsburgh. Two 12-ton Siemens furnaces.

Leechburg Sheet Iron and Tin Plate Works, Kirkpatrick & Co. Limited, Leechburg. Office, 143 First avenue, Pittsburgh. One 10-ton Siemens furnace.

Linden Steel Company Limited, Pittsburgh. One 7-ton and one 10-ton Siemens furnace.

Midvale Steel Company, Nicetown P. O., Philadelphia. One 7-ton and two 12-ton Siemens furnaces.

Pennsylvania Steel Company, Steelton. Office, 208 South Fourth st., Philadelphia. Two 30-ton Siemens furnaces.

Singer, Nimick & Co. Limited, Pittsburgh. One 10-ton Siemens furnace.

Soho Iron Mills, Moorhead & Co., Pittsburgh. One 12-ton Siemens furnace.

Spang Steel and Iron Company Limited, Pittsburgh. One 7-ton Siemens furnace completed and one 10-ton Siemens furnace building.

Standard Steel Casting Company, Thurlow, Delaware county. One 10-ton Siemens furnace.

West Penn Steel Works, Joseph G. Beale, Leechburg. One 7-ton Siemens furnace.

KENTUCKY—1.

Mitchell, Tranter & Co., Second and Race sts., Cincinnati. Works at Covington, Ky. One 7-ton Siemens furnace.

TENNESSEE—1.

Roane Iron Company, Chattanooga. Two 10-ton Siemens furnaces.

OHIO—7 COMPLETED AND 1 BUILDING.

Burgess Steel and Iron Works, Portsmouth. One 8-ton Siemens furnace.

Canton Steel Works, Bolton Steel Company, Canton. One 10-ton Siemens furnace.

Cleveland Rolling Mill Company, Cleveland. Three 7-ton and two 15-ton Siemens furnaces.

Otis Iron and Steel Works, Otis Iron and Steel Company, Cleveland. Four 15-ton Siemens furnaces.

Portsmouth Iron and Steel Works, John Means, trustee, Ashland, Ky. Works at Portsmouth. One 10-ton Siemens furnace.

Solid Steel Company, Alliance, Stark county. One 10-ton open-hearth furnace.

Whitely, Fasler & Kelley, Springfield. Building an open-hearth furnace.

Youngstown Steel Company, Youngstown. One 20-ton Siemens furnace.

ILLINOIS—2.

Calumet Iron and Steel Company, Chicago. Four Siemens furnaces.

Springfield Iron Company, Springfield. Two 20-ton Siemens-Pernot furnaces.

CALIFORNIA—1.

Pacific Rolling Mill Company, 16 First st., P. O. Box 2,032, San Francisco.
One Siemens furnace.

UNITED STATES.

Total number of open-hearth steel works in the United States: 35 completed, and 3 building. Number of furnaces: 58 completed, and 5 building.

STEEL MANIPULATING WORKS.

NOTE.—These works are fully described in the list of rolling mills. They manipulate *purchased* crucible cast steel and steel scrap, or roll Bessemer steel blooms, Bessemer steel rail ends, old Bessemer steel rails, or Siemens-Martin steel ingots, blooms, or billets. Several of these works are solely engaged in the manipulation of purchased steel, but it will be observed that others are also largely engaged in the manufacture of iron or of crucible cast steel.

MASSACHUSETTS—3.

Bridgewater Iron Company, Bridgewater. Roll steel from steel scrap.
Cambridge Rolling Mills, Gilmore & Eustis, Cambridgeport. Roll steel from steel scrap.
Washburn and Moen Manufacturing Company, Worcester. Roll wire rods from crucible and Bessemer steel.

CONNECTICUT—1.

Windsor Locks Steel Company, Windsor Locks. Roll Siemens-Martin and Bessemer steel.

NEW YORK—2.

Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse.
Roll Bessemer steel.
Syracuse Iron Works, Syracuse. Roll steel from steel scrap.

NEW JERSEY—5.

Adirondac Steel Works, H. J. Hopper, Jersey City. Roll Bessemer and Siemens-Martin steel.
Jersey City Steel Works, Jersey City Steel Company, Jersey City.
Newark Steel Works, Benjamin Atha & Co., Newark.
Trenton Iron Company, Trenton. Roll wire rods from steel.
West Bergen Steel Works, Spaulding & Jennings, West Bergen. Reroll Bessemer and open-hearth steel billets.

PENNSYLVANIA—24.

Beaver Falls Steel Works, Beaver Falls, Beaver county.
Canonsburg Iron Company Limited, Canonsburg.
Catasauqua Manufacturing Company, Catasauqua. Manipulate Bessemer steel.
Chartiers Iron and Steel Company Limited, 143 First avenue, Pittsburgh.
Works at Mansfield Valley, Allegheny county.
Combination Steel and Iron Company, Chester, Delaware county.
Eagle Rolling Mill and Tube Works, J. W. Friend & Co., Pittsburgh.
Gautier Steel Department of Cambria Iron Company, Johnstown. Roll Bessemer and open-hearth steel.
Green Ridge Iron Works, A. L. Spencer, Scranton.
Harrisburg Steel and Iron Works Limited, Hummel, Fendrich & Co., Harrisburg. Idle.
Hartman Steel Company Limited, Beaver Falls, Beaver county.
Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware avenue, Philadelphia.
La Belle Steel Works, Smith, Sutton & Co., Pittsburgh.
Leechburg Sheet Iron and Tin Plate Works, Kirkpatrick & Co. Limited, Leechburg.
Lukens Rolling Mills, Charles Huston & Sons, Coatesville, Chester county.
Myers (H. M.) & Co. Limited, Beaver Falls.
Oxford Iron and Steel Works, William & Harvey Rowland, Frankford P. O., Philadelphia. Roll Bessemer and Siemens-Martin steel.
Pencoyd Iron Works, A. & P. Roberts & Co., 261 South Fourth st., Philadelphia.
Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Company, W. E. C. Coxe, Superintendent, Reading. Roll steel rails from purchased blooms.
Standard Steel Works, 220 South Fourth st., Philadelphia. Works near Lewistown. Roll steel tires from Siemens-Martin steel.
Union Forge and Iron Mills, Wilson, Walker & Co. Limited, Pittsburgh.
Union Iron Mills, Carnegie Brothers & Co. Limited, Pittsburgh.
United States Iron and Tin Plate Works, United States Iron and Tin Plate Company, Demmler Station, McKeesport, Allegheny county.
Vulcan Forge and Iron Works, Long & Co., Pittsburgh.
Wayne Iron and Steel Works, Brown & Co., Pittsburgh.

DELAWARE—1.

Christiana Iron Company, Wilmington.

MARYLAND—1.

Locust Point Iron and Steel Works, Coates & Co., Baltimore.

WEST VIRGINIA—1.

Standard Nail and Iron Company, Clifton, Mason county. Roll steel nail plate from purchased blooms.

KENTUCKY—1.

Swift's Iron and Steel Works, 26 West Third st., Cincinnati, Ohio.
Works at Newport, Campbell county, Ky.

TENNESSEE—1.

Roane Iron Company, Chattanooga. Roll Bessemer steel rails from purchased blooms.

OHIO—7.

Columbus Rolling Mill, Columbus Rolling Mill Company, Columbus.
Roll steel rails from purchased blooms.

Globe Rolling Mill, Globe Rolling Mill Company, Cincinnati. Roll steel from steel scrap.

H. P. Nail Company, Cleveland.

Iron-ton Rolling Mill, New York and Ohio Iron and Steel Company, Iron-ton. Agricultural steel.

Lake Erie Iron Company, Cleveland. Roll steel axles.

Riverside Iron and Steel Works, Swift's Iron and Steel Works, lessee,
26 West Third st., Cincinnati. Works at Riverside, Hamilton county.
Youngstown Rolling Mill Company, Youngstown.

INDIANA—1.

Indianapolis Rolling Mill, Indianapolis Rolling Mill Company, Indianapolis.

ILLINOIS—4.

Chicago Steel Works, 806 Noble st., Chicago. Roll Bessemer steel.

Chicago Tyre and Spring Works, Chicago. Roll tires from imported blooms.

St. Louis Bolt and Iron Company, St. Louis, Mo. Works in St. Clair county, Ill. Roll light rails and steel tires from old Bessemer steel rails.

Western Steel Company, Chicago. Roll steel horse-shoe bar.

MISSOURI—1.

Helmbacher Forge and Rolling Mills Company, Allen Building, St. Louis.

MICHIGAN—1.

Detroit Steel and Spring Works, Detroit.

CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco. Roll steel rails from purchased blooms.

UNITED STATES.

Total number of steel manipulating works in the United States : 55.

MISCELLANEOUS STEEL WORKS.

NOTE.—These works are fully described in the list of rolling mills. They do not produce Bessemer, open-hearth, or crucible cast steel, but *only* make puddled, blister, German, McHaffey, or patent steel.

NEW YORK—1.

Onondaga Steel Works, Sweet's Manufacturing Company, Syracuse.
Product, blister steel.

NEW JERSEY—1.

Solid Steel Casting Company, Mills Building, New York City. Works
at North Newark. Product, steel castings.

PENNSYLVANIA—4.

Chester Steel Castings Company, 407 Library st., Philadelphia. Works
at Chester. Product, McHaffey steel castings.

Eureka Cast Steel Company, Lamokin, near Chester. Product, steel
castings.

Liggett Spring and Axle Company Limited, Spruce and Market sts.,
Allegheny City. Product, German steel.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford,
Philadelphia. Product, blister steel.

UNITED STATES.

Total number of miscellaneous steel works in the United States : 6.

FORGES.

NOTE.—Under this title are embraced all works which make wrought iron from ore. All direct processes are included under this head.

MAINE.

Thomes, O. S., Cumberland Centre, Cumberland county. Forge at Webb's Mills. Built in 1883; 3 fires.

VERMONT.

East Middlebury Iron Works, Williams & Nichols, East Middlebury, Addison county. Rebuilt in 1880; 4 fires and 1 hammer; product, charcoal blooms for steel, made from ore; annual capacity, 1,300 net tons. H. J. Nichols, Agent.

Pittsfield Iron and Steel Company, Pittsfield, Rutland county. Works at Chittenden, Rutland county; built in 1881-2; 8 fires and 1 hammer; product, charcoal blooms for steel purposes, made by improved Catalan forges from magnetic sand ore existing in gneiss formation. William G. Bell, President, and J. Foster Clark, Treasurer, Boston; J. J. Saltery, Superintendent, Pittsfield.

Number of forges in Vermont: 2.

NEW YORK.

LAKE CHAMPLAIN DISTRICT.

Altona Bloom Iron Works, G. W. & F. Palmer & Co., Altona, Clinton county. Two forges: One at Altona, built in 1868; 6 fires and 1 hammer; brand, "Altona." One at Alder Bend, 4 miles from Altona, built in 1880; 6 fires. Water-power; product, charcoal blooms for boiler plate and sheet iron, made from Chateaugay ore; annual capacity of each forge, 2,400 net tons.

Chateaugay Ore and Iron Company, Plattsburgh, Clinton county. Four works: Plattsburgh, Chateaugay Lake, Clayburgh, and Russia. Plattsburgh Iron Works were built at Plattsburgh, Clinton county, in 1879 as a rolling mill; converted into a forge in 1883; 4 fires and 1 hammer. Chateaugay Lake Iron Works were built at Chateaugay Lake, Franklin county, in 1875; 16 fires and 3 hammers. Clayburgh Iron Works were built at Clayburgh, Clinton county, in 1844; rebuilt and enlarged in 1883; 7 fires and 1 hammer. Russia Iron Works were built at Moffittsville, Clinton county, in 1844; enlarged in 1883; 7 fires and 1 hammer. All run by water-power; product, charcoal blooms for general purposes, made from Chateaugay ore; total annual



- capacity, 12,000 net tons. Andrew Williams, President, Plattsburgh; H. M. Olmsted, Treasurer, 21 Cortlandt st., New York; M. F. Parkhurst, Cashier, Plattsburgh; A. L. Inman, General Manager, Plattsburgh. *See Charcoal Furnaces.*
- Horicon Iron Company, 24 Cliff st., New York. Works at Ticonderoga, Essex county. Built in 1865; 6 fires and 2 steam hammers; product, charcoal blooms for crucible and open-hearth steel, made from ore. Cyrus Butler, President; Hermon B. Butler, Secretary and Treasurer; Morton Butler, Superintendent.
- Irona Forge, J. F. Reynolds, Irona, Clinton county. Built in 1868 by Reynolds, Smith & Co., who were succeeded on January 1, 1870, by Asa Reynolds, who was succeeded on November 1, 1876, by present owner; 5 fires and 1 hammer; product, "Chateaugay" blooms, from Chateaugay ore, intended wholly for steel.
- Ironville Iron Works, Crown Point Iron Company, Ironville, Essex county. Main office at Crown Point. Built in 1828, and rebuilt in 1879; 8 fires and 1 hammer; steam-power; product, charcoal blooms for steel, made from ore; annual capacity, 2,400 net tons. J. N. Stower, Superintendent. *See Anthracite Furnaces.*
- Keene Forge, W. F. & S. H. Weston, Keene, Essex county. Built in 1880, and put in operation January 1, 1881; 6 fires and 1 hammer; water-power; product, charcoal blooms and billets for boiler plate and steel, made from Keene ore; brand, the letter W in a circle. *See Wilmington Forge.*
- Lewis Iron Works, Stower & Esmond, Essex, Essex county. Works at Lewis, Essex county. Built in 1837; rebuilt in 1875; 5 fires and 1 hammer; steam and water power; product, charcoal blooms for plate and sheet iron, wire, and steel, from ore alone.
- New Russia Iron Works, H. A. Putnam, Elizabethtown, Essex county. Forge at New Russia, 4 miles south of Elizabethtown. Rebuilt in 1879-80; 1 hammer and 4 fires; steam and water power; product, charcoal blooms for wire and steel, made from ore.
- Payne's Forge, D. F. Payne, Wadham's Mills, Essex county. Built in 1873; 4 fires and 1 hammer; water-power; product, charcoal blooms for best boiler plate, made from ore; annual capacity, 2,000 net tons.
- Peru Steel and Iron Company, F. J. Dominick, Receiver, 115 Broadway, New York. Works and main office at Clintonville, Clinton county. Built in 1837; 16 fires and 4 hammers; water-power; product, charcoal blooms for steel, made from Palmer ore exclusively; annual capacity, 5,000 net tons.
- Petersburg Iron Works, Peter Tremblay, Clayburgh, Clinton county. Forge at Petersburg. Four fires and 1 hammer; water-power; product, charcoal blooms for steel, made from ore.
- Rockville Forges, Stephen Stackpole, Altona, Clinton county. Two forges, 3 miles apart. One built in 1874, burned and rebuilt in 1879; the other built in 1879; 7 fires and 2 hammers; product, charcoal blooms, from ore.

Sable Iron Works, J. & J. Rogers Iron Company, Ausable Forks, Essex county. One forge at Ausable Forks, built in 1848; 4 fires. Two forges at Black Brook, Clinton county, built in 1832; 12 fires. One forge at Jay, Essex county, built in 1809; 6 fires. Total, 22 fires, with 5 hammers; all run by water-power; product, charcoal blooms for best tool cast steel, made from ore; total annual capacity, 8,000 net tons. *See Rolling Mills.*

Star Iron Works, Bowen & Signor, Saranac, Clinton county. Three forges in Clinton county. Two at Saranac, built in 1844, and one at Redford, built in 1880; one of the forges at Saranac has 7 fires and 2 hammers, and the other has 6 fires and 1 hammer; both operated by water-power. The forge at Redford has 4 fires and 1 hammer; water-power. Product of the three forges, steel billets and refined charcoal blooms for Siemens-Martin steel purposes. *See Rolling Mills.*

Stone Forge, Nichols & Hull, Plattsburgh, Clinton county. Built in 1835; 6 fires and 1 hammer; water-power; product, charcoal blooms for all purposes, made from ore; annual capacity, 2,000 net tons.

Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835, and rebuilt in 1863; 4 fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and wire, made from ore.

Wilmington Forge, W. F. & S. H. Weston, Wilmington, Essex county. Rebuilt in 1874; 4 fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and steel, made from Keene ore; brand, two W's in circles. *See Keene Forge.*

Wood, Wm. W., Wood's Falls, Clinton county. Built in 1863, and rebuilt in 1872; 10 fires, (3 of which are knobbling fires,) 1 run-out fire, 1 cupola for casting, and 2 hammers; water-power; product, charcoal blooms, made from ore and occasionally from scrap iron; annual capacity, 4,000 net tons. *See Rolling Mills.*

Number of forges in New York: 28.

PROJECTED.

Bull's International Iron and Steel Company, 102 Broadway, New York. Direct process furnace projected near Brewster's, Putnam county.

NEW JERSEY.

American Swedes Iron Company, Rockaway, Morris county. Four fires and 1 steam hammer; product, charcoal blooms by the Wilson process, from black sand ore, brought from Block Island, R. I.; weekly capacity, 35 net tons. *See Rolling Mills.*

Split Rock Forge, Edward J. Reed, Brooklyn, N. Y. Address, 202 Broadway, New York City. Works at Split Rock, Morris county. Built in 1797, and rebuilt in 1837. Wilson deoxidizing furnace built in 1874, and remodeled in 1878; 4 fires and 1 hammer; water-power; product, refined charcoal blooms, from ore; annual capacity, 1,300 net tons.

Number of forges in New Jersey: 2.

PENNSYLVANIA.

Siemens-Anderson Steel Company, William Rea, trustee for creditors, Pittsburgh. Three Siemens rotators. Product, blooms for open-hearth steel. Idle.

Tyrone Forges, M. V. Smith & Co., Tyrone, Blair county. Established in 1809; forge rebuilt in 1870, with 12 fires; 1 double run-out and 1 hammer. *See Rolling Mills.*

Number of forges in Pennsylvania: 2.

VIRGINIA.

Bowling Green Forge, Bales' Mills, Lee county. Built in 1829; 2 fires and 1 hammer; water-power; product, bar iron for local use, made from hematite ore.

Penington's Forge, Wm. Penington, Jonesville, Lee county. Built in 1873; 1 fire and 1 hammer; water-power; product, bar iron for neighborhood use, made from ore and scrap iron.

Reed Island Forge, J. S. Crockett, lessee, Allisonia, Pulaski county. Built in 1875; water-power; 2 fires; product, bar iron from brown hematite ore.

Number of forges in Virginia: 3.

NORTH CAROLINA.

Catawba Valley Iron Works, John W. Blackwelder, Catawba, Catawba county. Built in 1874; 7 forge fires, 4 run-out fires, and 2 hammers; steam and water power; fuel, charcoal; product, bar iron, plow moulds, etc., made from ore and some scrap.

Henson's Forge, H. Warlick, Murphy, Cherokee county. Built in 1840; 2 fires, 1 run-out, and 1 hammer; water-power; fuel, charcoal; product, bar iron for local use, made from ore.

Hyatt's Forges, Martin Hyatt, Mount Airy, Surry county. Two forges on Bull run, Stokes county. Product, bar iron for local use, made from ore.

Madison Forge, Jonas W. Derr, Lincolnton, Lincoln county. Built about 1830; 3 fires and 2 hammers; water-power; fuel, charcoal; product, bar iron for local use, made from ore, scrap, and pig iron. *See Furnaces.*

Maiden Creek Forge, William Williams & Son, Maiden, Catawba county. Built about 1825; 2 fires and 1 hammer; water-power; fuel, charcoal; product, bar iron for local use, made from ore and scrap iron.

Owl Creek Forge, Mercer Fain, Murphy, Cherokee county. Built in 1852; 2 fires; water-power; product, bar iron for local use, made from ore.

Roan Mountain Steel and Iron Company, Wilder's, Mitchell county. Built in 1875; 3 forge fires and 1 hammer; water-power; product, charcoal blooms, made from ore. W. D. Jenkins, Superintendent.

Rocky Point Forge, Dr. J. W. Patton, Murphy, Cherokee county. Re-

built in 1870; 2 fires and 1 hammer; water-power; fuel, charcoal; product, charcoal blooms for boiler plate, made from ore.

Tom's Creek Forge, J. L. & D. W. Worth. Forge on Tom's creek, Stokes county. Built in 1862; 2 fires and 1 hammer; product, bar iron for local use, made from ore. Owners, J. L. Worth, Mt. Airy, and D. W. Worth, Bliss P. O.

Tuscarora Forge, North Carolina Centre Iron and Manufacturing Company, Guilford county. Forge in Guilford county. Built in 1869; 4 fires.

Number of forges in North Carolina: 11.

TENNESSEE.

Click's Forge, Green Click, Middle Creek, Sevier county. Forge on Middle creek, Greene county, 7 miles southeast of Greeneville.

Dugger's Forge, Dugger's heirs, Stump Knob, Johnson county. Forge near Watauga river. Built in 1820; 2 fires and 1 hammer; water-power; product, bar iron for local use, made from ore. Now idle.

Jackson's Forge, A. E. Jackson, Jonesboro, Washington county. Forge in Unicoi county, on Clarke's creek, 15 miles south of Jonesboro. Idle for several years.

King's Works, James E. Northington, Shady, Johnson county. Built in 1838; 2 fires and 1 hammer; water-power; product, bar iron for local use, made from ore.

Laurel Iron Works, T. G. McConnell, Abingdon, Virginia. Works at Laurel Bloomery, Johnson county. Built in 1824; rebuilt in 1848; 2 fires and 1 hammer; additional facilities can easily be added; water-power. Idle and for sale.

Little Doe Forge, Wm. A. Morley, High Heath, Johnson county. Forge on Little Doe creek, 13 miles west of Taylorsville; 2 forge fires and 2 hammers; water-power; product, bar iron, made from ore.

McQueen's Forge, Isaac McQueen, Baker's Gap, Johnson county. Forge on Roane creek, 10 miles southeast of Taylorsville, built in 1877.

Morrison's Forge, Nat. Morrison, Head of Laurel P. O., Johnson county. Forge on Laurel creek, 7 miles from Taylorsville. Built in 1879; 3 fires and 1 hammer; water-power; product, bar iron for local use, made from ore.

Mud Splatter Forge, G. D. Heaton, lessee, Howard's Iron Works P. O., Johnson county. Built in 1867; 2 fires and 1 hammer; water-power. Owned by M. M. Wagner's Sons.

Potter's Forge, O. J. Potter, Shoun's X Roads, Johnson county. Forge on Roane creek, 4 miles southeast of Taylorsville. Built in 1867-8; 2 forge fires and 1 hammer; water-power; product, bar iron, from ore.

Rhea's Forge, Dr. Robert Rhea, Shoun's X Roads, Johnson county. Built in 1880.

Roane Creek Forge, B. R. Brown, Shoun's X Roads, Johnson county. Built in 1859; 2 fires and 1 hammer; water-power; product, bar iron for local use, made from ore.

Rocky Ford Forge, J. W. McQueen, Shoun's X Roads, Johnson county. Built in 1875; 2 forge fires, 2 run-out fires, and 1 hammer; water-power; product, bar iron, made from ore.

Sand Hill Forge, Daniel Slimp, Baker's Gap, Johnson county. Forge on Roane creek, 8 miles southeast of Taylorsville. Built in 1852; 2 fires and 2 hammers; water-power; product, bar iron from ore.

Shupe's Forge, Thomson Shupe, Shady, Johnson county. Built in 1872; 2 fires and 1 hammer; water-power; product, bar iron for local use, made from ore.

Speedwell Forge, Harbison & Longmire, Speedwell, Claiborne county. Built in 1873-4; 2 fires; one for refining pig iron, capacity 600 lbs. per day; and the other to make iron direct from the ore, capacity 300 lbs. per day; fuel, charcoal; product, horse-shoe bars, wagon tires, etc.

Valley Forge, H. C. Smith, Elizabethtown, Carter county. Forge on Doe river, 3 miles southeast of the village. Built in 1820; 3 fires and 1 hammer; water-power. Has been idle for many years.

Wagner's Forges, M. M. Wagner's Sons, Taylorsville, Johnson county. Two forges on Little Doe creek; one 7 miles and the other 9½ miles west of Taylorsville.

Walker's Forge, Jefferson Walker, Pandora, Johnson county. Forge on Little Doe creek, 8 miles west of Taylorsville.

Number of forges in Tennessee: 20.

In the mountainous districts of East Tennessee the forges are usually operated by farmers who only make bar iron from ore whenever it is needed in their immediate neighborhood. The forges are generally given the names of their proprietors. Each forge usually has two fires. Daily production about 250 lbs. to the fire; much depends upon the water-power which drives the blast and hammer; in exceptional cases even 700 lbs. a day are made.

MISSOURI.

Peckham Iron Company, Kimmswick, Jefferson county. Built in 1873, and remodeled in 1877-9; 12 Peckham converting furnaces and fires to make iron by Peckham's patent direct process; 3 steam hammers; product, charcoal blooms for Siemens-Martin steel; annual capacity, 4,000 net tons. C. S. Greeley, President, St. Louis; E. Peckham, Vice-President and General Manager, Kimmswick; J. C. Porter, Assignee, Kimmswick.

Number of forges in Missouri: 1.

Total number of iron-ore forges in the United States: 70. In addition to these works, the Collins Company, at Collinsville, Connecticut, makes a small quantity of wrought iron from ore, as also do Miller, Metcalf & Parkin, at Pittsburgh, Pennsylvania. At the works of the Phoenix Iron Company, at Safe Harbor, Pennsylvania, iron has been made from mill cinder by the Du Puy direct process.

BLOOMARIES.

NOTE.—Under this title are embraced all works which hammer blooms from pig or scrap iron. Many plate, sheet, and wire makers have charcoal forge fires in their mills making blooms for their own use, but such establishments are not named in this list.

MASSACHUSETTS.

Mount Hope Iron Works, East Bridgewater, Plymouth county. Office at Somerset, Bristol county. Built in 1840; 2 forge fires and 1 hammer; water-power; product, charcoal blooms for tack plate, made from scrap iron. *See Rolling Mills.*

Number of bloomaries in Massachusetts: 1.

CONNECTICUT.

Canton Bloomary Company, Collinsville, Hartford county. Built in 1880; 3 forge fires; water-power; product, charcoal blooms for fine forgings, steel-making, and wire rods, made from scrap iron; brand, "C. B. C.;" annual capacity, 2,000 net tons. William J. Wood, President; Edward H. Sears, Vice-President and Manager; William A. Baker, Treasurer; Oliver F. Perry, Secretary.

Number of bloomaries in Connecticut: 1.

NEW JERSEY.

Bloomingtondale Forge, Martin J. Ryerson, Bloomingtondale, Passaic county. Built in 1800, and rebuilt in 1841; 3 fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and wire, made from scrap iron.

Paterson Bloomary, Peter Oberg & Co., Paterson, Passaic county. Built in 1878; 4 fires and 1 hammer; product, cold blast charcoal blooms and charcoal iron for boiler plate and wire, made from scrap iron; annual capacity, double turn, 2,500 net tons.

Port Oram Forge, Port Oram Manufacturing Company, Port Oram, Morris county. Built in 1878; started in August, 1878; 8 forge fires, 1 run-out fire, and 2 hammers; product, charcoal blooms, from scrap and pig iron, used for all purposes; annual capacity, double turn, 4,500 net tons. Robert F. Oram, President; Edward S. Hance, Superintendent.

Powerville Forge, Joel Wilson, lessee, Dover. Works at Powerville. Built in 1845; 3 forge fires and 1 hammer; water-power; product, charcoal blooms for wire, made from scrap iron; annual capacity, 900 net tons. B. F. Howell, owner, Morristown. *See Rolling Mills.*

Rockaway Forge, T. H. Hoagland, Rockaway, Morris county. Built about 1800; 3 forge fires and 1 hammer; water-power; product, charcoal blooms for wire, made from scrap iron; annual capacity, double turn, 1,000 net tons.

Steam Forge, George E. Righter, lessee, Parsippany. Forge at Rockaway, Morris county. Built in 1878; 4 forge fires and 1 hammer; product, charcoal blooms for boiler plates, wire, and flange iron, made from scrap iron; annual capacity, 1,300 net tons. Owned by B. B. Oram. *See Windham Forge.*

Warren Forge, American Sheet Iron Company, Phillipsburg, Warren county. Built in 1875; one 4-tuyere run-out, 3 forge fires, and 1 steam hammer; product, charcoal blooms for sheet iron, made from pig iron; annual capacity, 1,000 net tons. *See Rolling Mills.*

Windham Forge, George E. Righter, lessee, Parsippany, Morris county. Forge at Stockholm. Two fires and 1 hammer; water-power; product, charcoal blooms for plate iron, wire, or steel, made from scrap; annual capacity, 800 net tons. *See Steam Forge.*

Number of bloomaries in New Jersey: 8.

PENNSYLVANIA.

Barree Forge, J. W. Mumper & Co., Barree Forge, Huntingdon county. Built in 1785; 6 forge fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 2,000 net tons. *See Charcoal Furnaces.*

Bellefonte Iron Works, Valentines & Co., Bellefonte, Centre county. Built in 1810; 12 forge fires, one 6-tuyere run-out, and one 4-ton hammer; product, charcoal blooms for boiler plate, tubes, wire, nail rods, etc., made from pig iron; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Carlisle Iron Works, C. W. Ahl & Son, Carlisle. Works at Boiling Springs, Cumberland county. Built in 1760, and rebuilt in 1860; 5 forge fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 2,200 net tons. Brand, "Carlisle." *See Furnaces.*

Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Built before 1749; 5 forge fires, 1 heating furnace, 1 refinery, and 1 hammer; water-power; product, charcoal and coke blooms for boiler plate and sheet iron, made from pig iron; annual capacity, 1,000 net tons.

Colemanville Works, Edward S. Davies, Colemanville, Lancaster county. Built in 1828; 3 forge fires, 1 run-out fire, and 1 hammer; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 500 net tons. William I. Rutter, Manager.

Cove Forge, John Royer, Williamsburg, Blair county. Works on Frankstown branch, 2 miles northeast of Williamsburg. Built in 1811; 3 charcoal forge fires, 2 coke run-out fires, and 1 hammer; water-power; product, No. 1 charcoal blooms, chunks, and slabs, made

- of charcoal pig iron from Springfield Furnace; metal tapped from run-out to forge; annual capacity, 600 net tons. S. R. Schmucker, Manager, Williamsburg. *See Charcoal Furnaces.*
- Cove Forge, Wm. McIlvain & Sons, Duncannon, Perry county. Office, Reading, Pa. First put in operation in 1864; 5 fires, 1 refinery, and 1 hammer; blast operated by water-power, and hammer by steam; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,200 net tons. Francis Heilig, Superintendent, Duncannon. *See Eastern Pennsylvania Rolling Mills.*
- Eagle Forge, Curtins & Co., Roland, Centre county. Built in 1809 by Curtin & Boggs, succeeded by Roland Curtin soon after; 8 fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron; specialties, blooms for boiler plate and rivet rods; annual capacity, 1,500 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Ellendale Forge, Killinger, Kaufman & Co., Ellendale Forge, Dauphin county. Built in 1838, and rebuilt in 1872; 5 charcoal forge fires, 1 coke run-out, and 1 hammer; steam and water power; original manufacturers of the "Sheridan" blooms, made exclusively from Sheridan pig iron, used for boiler, flue, and sheet iron; annual capacity, 1,200 net tons. P. C. Snyder, Superintendent.
- Ellwood Forge, Dr. G. N. Eckert's heirs, Ellwood, Schuylkill county. Built in 1863; 4 fires and 1 run-out; water-power; product, charcoal blooms for general purposes, made from pig iron; annual capacity, 1,250 net tons. Not in operation since 1879.
- French Creek Forge, Esther Kaufman, St. Peters P. O., Chester county. Built in 1872; 4 fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from scrap iron. Thomas Wanner, Attorney.
- Gibraltar Iron Works, S. Seyfert & Co., Reading, Berks county. Built in 1846; 1 coke run-out, 4 charcoal forge fires, and 2 hammers; water-power; product, charcoal blooms for flue iron and boiler plate; annual capacity, 500 net tons. *See Eastern Pennsylvania Rolling Mills.*
- Howard Iron Works, Bernard Lauth, Howard, Centre county. Built in 1879; 10 fires, one 6-tuyere run-out, and 1 steam hammer; steam and water power; product, charcoal blooms; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*
- Juniata Forge, J. A. & E. Eichelberger, Petersburg, Huntingdon county. 5 fires, 1 run-out fire, and 1 hammer; water-power; product, charcoal blooms, made from pig iron; annual capacity, 800 net tons. *See Charcoal Furnaces.*
- Laurel Forge, South Mountain Mining and Iron Company, Pine Grove Furnace, Cumberland county. Built in 1830; 6 fires, 1 double run-out, and 1 hammer; water-power; product, charcoal blooms for general purposes, made from Pine Grove pig iron; annual capacity, 2,000 net tons. Joseph Fuller, Superintendent. *See Furnaces.*

Liberty Forge, Lloyd & Boyer, Lisburn, Cumberland county. Built in 1836; 3 fires, 1 run-out, and 1 hammer; water-power; product, charcoal and coke blooms for general purposes, made from pig iron.

Lickdale Forge, Sherk & Meily, lessees, Lebanon. Forge at Lickdale P. O., Lebanon county. Built about 1790; torn down in 1884, and a new forge erected; 6 forge fires, 1 run-out, and 1 hammer; steam and water power; product, charcoal blooms for wire, boiler plate, and sheet iron, made from scrap and pig iron; annual capacity, 3,600 net tons.

Lucknow Forge, Seidel Brothers, lessees, Harrisburg. Forge at Lucknow Station, P. R. R., 4 miles west of Harrisburg; 8 forge fires and 1 steam hammer; product, blooms for boiler plate, sheet iron, wire, etc., made from pig and scrap iron; annual capacity, 3,500 net tons. *See Perry Forge.*

Mainville Forge, Charles Reichart, Mainville, Columbia county. Built in 1824; 3 fires, 1 run-out, and 2 hammers; water-power; product, charcoal blooms for boiler plate, made from pig iron and old car-wheels; annual capacity, 300 net tons.

Martic Forge, Davies & Potts, Colemanville, Lancaster county. Built in 1755; 4 fires, 1 run-out, and 2 hammers; water-power; product, charcoal blooms for boiler plate, made from pig iron; annual capacity, 800 net tons. R. S. Potts, Agent.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 7 fires and 1 hammer; water-power; product, charcoal blooms for best wire, made from pig iron. Wire used for flat and round head wood screws and for best grade of carriage bolts. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Mont Alto Iron Works, Mont Alto Iron Company, Mont Alto, Franklin county. Built in 1866; 8 forge fires and a double run-out fire; 1 Nasmyth steam hammer and 1 self-acting steam helve hammer; product, flat charcoal blooms for best boiler plate, made from pig iron; annual capacity, 3,000 net tons. Brand, "Mont Alto." General office at the works, and all sales made by the Superintendent, George B. Wiestling. *See Charcoal Furnaces.*

Mount Airy Forge, Thomas E. Williams, Manager, Shartlesville, Berks county. Built about 1840; 2 forge fires, one 4-tuyere run-out, and 1 hammer; water-power; product, run-out anthracite, charcoal, and scrap blooms and billets for boiler plate, sheets, and wire; annual capacity, 450 net tons. Owned by Robert C. Green, Pottsville.

Mount Etna Forge, Samuel Isett, Yellow Springs, Blair county. Built in 1808; 4 fires and 1 hammer; water-power; product, charcoal blooms for boiler plate and general purposes, made from pig iron. Idle by reason of the abandonment of the Pennsylvania Canal. *See Charcoal Furnaces.*

Moyer's Forge, Jacksonwald, Berks county. Built in 1836; 3 fires and 1 hammer; water-power; product, charcoal blooms for steel, made from pig iron and steel scrap.

New Market Forge, Samuel E. Light, lessee, Syner, Lebanon county. Rebuilt in 1860; 5 fires, 1 run-out, and one 5-ton hammer; steam and water power; product, charcoal blooms for boiler plate and coal shute iron, made from scrap iron; annual capacity, 1,300 net tons. Theodore B. Klein, proprietor. *See Rolling Mills.*

North Kiln Forge, M. B. Seyfert & Co., Shartlesville, Berks county. Built in 1830, and repaired and started in 1879 after a long idleness. Product, run-out anthracite blooms. Wm. H. Seyfert, Agent.

Perry Forge, Seidel Brothers, Marysville, Perry county. Built in 1862; 7 forge fires, 1 run-out fire, and 1 hammer; water and steam power; product, charcoal and anthracite blooms for boiler plate, sheet iron, wire, etc., made from pig iron; annual capacity, 2,800 net tons. *See Lucknow Forge.*

Schuylkill Steam Forge, B. F. Morret, Douglassville, Berks county. Completed in 1878; 8 fires, 1 double run-out, and 1 hammer; product, charcoal blooms for boiler plate and sheet iron, made from charcoal pig iron and scrap iron.

Spring City Forge, Francis & Co., Spring City, Chester county. Built in 1884; 6 forge fires and 1 hammer; product, blooms, used for plate and sheet iron, made from scrap iron; daily capacity, double turn, 14 net tons.

Springton Forge, John Cornog, Wallace, Chester county. Built in 1790, and rebuilt in 1881; 4 forge fires, 1 run-out, and 1 hammer; water-power; product, charcoal blooms.

Number of bloomaries in Pennsylvania: 31.

MARYLAND.

Northeast Forge, McCullough Iron Company, Northeast, Cecil county. Built in 1847 and 1875; 18 fires and 2 hammers; product, charcoal blooms for sheet iron exclusively, made from scrap and pig iron; annual capacity, 6,000 net tons. *See Rolling Mills in Delaware and Maryland.*

Principio Forge, George P. Whitaker Company, Principio, Cecil county. Built in 1883-4; 12 fires; product, blooms for sheet iron, made from pig iron. *See Furnaces.*

Number of bloomaries in Maryland: 2.

VIRGINIA.

Columbia Forge, Columbia Furnace P. O., Shenandoah county.

Eagle Furnace Forge, Crockett & Co., Crockett Depot, Wythe county. Built in July, 1882; 2 fires; product, bar iron for local use, made from pig iron. *See Furnaces.*

Graham's Forge, Graham & Robinson, Graham's Forge P. O., Wythe county. Built in 1827; 2 fires and 1 hammer; water-power; product, bar and other iron, from charcoal pig iron. *See Charcoal Furnaces.*

Liberty Forge, Liberty Furnace P. O., Shenandoah county. Built in

1821, and rebuilt in 1867; 3 forge fires, 1 run-out fire, and 2 hammers; water-power; product, charcoal blooms for general purposes, made from pig iron.

Milnes Iron Works, Shenandoah Iron Company, Milnes, Page county. Built in 1871; 7 forge fires, one 6-tuyere run-out, and 1 hammer; product, charcoal blooms for boiler plate and flange iron, made from pig iron; annual capacity, 1,800 net tons. Brand, "Wm. M., Jr." *See Furnaces.*

Mount Vernon Iron Works, Abbott Iron Company, Baltimore, Md. Works near Weyer's Cave, Rockingham county. Built in 1848; 5 fires and 1 hammer; water-power; product, charcoal blooms for general purposes, made from pig iron. Idle. *See Charcoal Furnaces. See Rolling Mills in Maryland.*

Pine Forge, J. C. Frederick & Co., Mount Jackson, Shenandoah county. Rebuilt in 1874; 1 forge fire, 2 hammers, 1 refinery, and 3 knobbling fires; water-power; product, blooms and bar iron.

Number of bloomaries in Virginia: 7.

TENNESSEE.

Speedwell Forge, Knoxville Car-wheel Company, Knoxville. Forge at Stony Creek, Carter county. One fire and 1 hammer; water-power; product, bar iron for local use, made from charcoal pig iron. *See Charcoal Furnaces.*

Number of bloomaries in Tennessee: 1.

OHIO.

Paulding Forge, Paulding Iron Company Limited, lessee, Cecil, Paulding county. Built in 1867; 8 fires and 1 steam hammer; product, charcoal blooms for general purposes, made from pig iron; annual capacity, single turn, 1,500 net tons. *See Northwestern Charcoal Furnaces.*

Number of bloomaries in Ohio: 1.

MISSOURI.

Germania Iron Works, Anthony Zeitinger, South St. Louis, St. Louis county. Built in 1871; 7 knobbling fires and 2 steam hammers; product, charcoal blooms for boiler plate and sheet iron and billets for carriage bolts and tack plate, made from pig iron; annual capacity, 1,500 net tons blooms and 400 net tons billets.

Number of bloomaries in Missouri: 1.

Total number of pig-and-scrap bloomaries in the United States: 53.

RECENTLY ABANDONED FORGES AND BLOOMARIES.

VERMONT.

Fairhaven Iron Works, Fairhaven, Rutland county. Built in 1796; 2 fires and 1 hammer.

NEW YORK.

Jefferson Iron Company, Antwerp, Jefferson county. One forge; 4 fires. Abandoned in 1873.

John Merchant's Forge, Schuyler Falls, Clinton county. Built in 1844.

Kingdom Forge, Essex and Lake Champlain Ore and Iron Company, Elizabethtown, Essex county. Built in 1825; 6 fires and 1 hammer.

Lake Champlain Forge, State of New York, owner, State Prison yard, Dannemora, Clinton county. Built in 1865; 9 fires and 1 hammer. Abandoned in 1877.

Merriam & Rouse, Westport, Essex county.

Paradox Iron Works, Schroon River, Essex county. Built in 1864.

Plattsburgh Iron Works, Plattsburgh, Clinton county. Built in 1878.

Schroon River Iron Works, Schroon River, Essex county. Built in 1857; burned in 1881.

Willsborough Forge, Belden Noble, Willsborough, Essex county. Built in 1835, and rebuilt in 1863; 4 fires and 1 hammer. Abandoned in 1883.

PENNSYLVANIA.

Allegheny Forge, Mrs. Elizabeth Lytle, Martinsburg, Blair county. Built in 1831. Abandoned in 1879.

Black Diamond Steel Works, Park, Brother & Co., Pittsburgh. One Siemens rotator, abandoned and wrecked in 1884.

Castle Fin Forge, James K. Brown, Castle Fin, York county. Built in 1835; abandoned in 1874.

Cold Spring Forge, Tyrone, Blair county.

Coleraine Forge, Shorb, Stewart & Co., Coleraine, Huntingdon county.

Franklin Forge, James Gardner, Hollidaysburg, Blair county. Four fires.

Juniata Iron Works, Samuel Hatfield, Alexandria, Huntingdon county. Built in 1837; 4 fires and one 4-tuyere run-out, and a puddling forge with 3 single puddling furnaces; water-power.

Logan Works, Lewistown, Mifflin county.

Maria Forge, G. W. Smith, Sarah, Blair county. Four fires and 1 hammer; water-power.

Mary Ann Forge, T. Benton Dowlin, executor, Downingtown, Chester county. Built in 1785.

Monroe Forge, Lebanon county.

Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county. Three fires and 1 run-out.

Sadsbury Forge, Charles Goodman & Brother, Atglen, Chester county. Built about 1820 to make bar iron; began to make blooms about 1850; rebuilt in 1863; 3 forge fires, 1 run-out fire, and 1 hammer; water-power. Burned in 1880.

Washington Forge, Lamar, Clinton county.

VIRGINIA.

Crockett, Sanders & Co., Wytheville, Wythe county. Built in 1863; 2 fires; destroyed by a freshet in 1878.

Gray Eagle Forge, David Huddle, Red Bluff, Wythe county. Built in 1862; 3 fires; destroyed by a freshet in 1878.

Mockasine Forge, James P. White, Estillville, Scott county. Built by Wm. B. White in 1851; 1 fire and 1 hammer; water-power.

Porter's Forge, A. L. Porter & Co., Speedwell, Wythe county. Built in 1865; 2 fires; destroyed by a freshet in 1878.

Wilkinson's Forge, Lobdell Car-wheel Company, Carroll county. Destroyed by a freshet in 1878.

NORTH CAROLINA.

Brevard's Forge, on Dutchman's creek, Lincoln county. Washed away.

Cranberry Forge, Mitchell county.

Rehoboth Forge, John Leonard & Co., Iron Station, Lincoln county.

Tomatola Forge, Tomatola Iron Company, Tomatola, Cherokee county. Office at Cincinnati. Built in 1869. Has been idle for many years.

GEORGIA.

Allatoona Creek Forge, Lewis T. Erwin, Allatoona, Bartow county. Built in 1878-9; 6 charcoal fires and 1 hammer. Burned in 1882.

WEST VIRGINIA.

Capon Iron Works, Keller & Co., Capon Iron Works, Hardy county. Built in 1874; 4 fires.

KENTUCKY.

Red River Forge, E. K. Goodnow, (of New York,) Fitchburg, Estill county.

TENNESSEE.

Camp Creek Forge, Jones & Kennedy, Camp Creek, Greene county. Built about 1815; 2 fires and 1 hammer. Idle for many years.

Chief Creek Forge, Napier Iron Company, Columbia, Maury county.

Works at Napier Furnace, Lawrence county. Built in 1860, and refitted in 1879-80; 4 fires and 2 hammers; water-power.

Hampton Iron Works, on Doe river, in the Crab Orchard, 18 miles southeast of Elizabethton, Carter county. Destroyed by a freshet.

Nave's Forge, John Nave, Watauga, Carter county. Forge on Stony creek, 6 miles north of Elizabethton.

Northington's Forge, James Northington, Shady, Johnson county.

Smith's Forge, John Smith, Watauga, Carter county. Forge on Stony creek, 10 miles north of Elizabethton.

MISSOURI.

Maramec Iron Works, Maramec Iron Company, Maramec Iron Works, Phelps county. Built in 1828; 8 fires and 2 hammers; water-power; product, charcoal blooms. Has not been in operation since 1876.

WIRE DRAWERS AND WIRE-ROD MILLS.

NOTE.—Those works which do not draw wire but which roll rods are indicated by the word "rods" placed after their names.

MAINE—2.

Kennebec Wire Works, Hallowell. Suspended.
The Eastern Wire Works, Harrison.

MASSACHUSETTS—11.

Geo. C. Prouty, Charlton City.

Gilmore & Eustis, Cambridgeport. Rods.

Gosnold Mills, New Bedford. Rods.

Horace Lamb & Co., Northampton.

Leicester Wire Company, Leicester.

Norway Steel and Iron Company, Boston. Rods and wire.

Palmer Wire Company, Palmer.

Prentiss (G. W.) & Co., Holyoke.

Spencer Wire Company, Spencer.

Washburn and Moen Manufacturing Company, Worcester. Rods and wire.

Worcester Wire Company, Worcester.

RHODE ISLAND—1.

American Screw Company, Providence.

CONNECTICUT—6.

Ansonia Brass and Copper Company, Ansonia.
Birmingham Rolling Mill, Peck, Stow, and Wilcox Company, Birmingham. Rods.
Gilbert and Bennett Manufacturing Company, Georgetown.
New Haven Rolling Mill Company, New Haven. Rods.
New Haven Wire Company, New Haven.
Stillwater Company, Stamford. Rods and wire.

NEW YORK—6.

Albany and Rensselaer Iron and Steel Company, Troy. Rods.
Cary & Moen, 234 West 29th st., New York City.
J. Wool Griswold, Troy.
R. H. Wolff & Co., 93 John st., New York City. Works at Bridgeport, Conn., and New York City.
Syracuse Iron Works, Syracuse. Rods.
Westerman Rolling Mill, Westerman, Bruce & Co., Lockport. Rods.

NEW JERSEY—3.

John A. Roebling's Sons Company, Trenton. Rods and wire.
New Jersey Steel and Iron Company, Trenton. Rods.
Trenton Iron Company, Trenton. Rods and wire.

PENNSYLVANIA—12.

Bernard Lauth, Howard, Centre county. Rods.
Cambria Iron Company, Johnstown. Rods.
Gautier Steel Department of Cambria Iron Company, Johnstown. Rods and wire.
Hartman Steel Company Limited, Beaver Falls. Rods and wire.
Hazard Manufacturing Company, Wilkesbarre.
Keystone Wire Works, T. B. Rainear, 35 South Twenty-third st., Philadelphia.
Lehigh and Franklin Wire Mills, Stewart & Co., Easton. Rods and wire.
Linden Steel Company Limited, Pittsburgh. Rods.
Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Rods and wire.
Oliver and Roberts Wire Company Limited, Pittsburgh. Rods and wire.
Thomas Hamilton, Philadelphia Wire Works, 1340 Vienna st., Philadelphia.
Williamsport Iron and Nail Works, Milton Iron Company, Williamsport. Rods.

MARYLAND—1.

Canton Wire Works, Canton.

OHIO—6.

American Wire Company, Cleveland.
Cleveland Rolling Mill Company, Cleveland. Rods and wire.
Columbus Iron Works, P. Hayden & Son, Columbus. Rods.
Globe Rolling Mill Company, Cincinnati. Rods and wire.
H. P. Nail Company, Cleveland. Rods and wire.
Otis Iron and Steel Company, Cleveland. Rods.

ILLINOIS—4.

Ashley Wire Company, Joliet.
Kraft, Gross & Co., Joliet.
Lambert and Bishop Wire Fence Company, Joliet.
Union Steel Company, Chicago. Rods and wire.

MISSOURI—2.

Harrison Wire Company, St. Louis.
St. Louis Wire Mill Company, St. Louis.

CALIFORNIA—1.

California Wire Works, 6 California st., P. O. Box 2,050, San Francisco.

UNITED STATES.

Total number of wire drawers and wire-rod mills in the United States :
55.

BRASS AND COPPER WIRE—12.

NOTE.—Some of the above-named works make copper and brass wire as well as iron and steel wire. The following establishments make brass and copper wire, but not iron or steel wire.

Bridgeport Brass Company, Bridgeport, Conn.
Brooklyn Brass and Copper Company, Brooklyn, N. Y.
Brown & Brothers, Waterbury, Conn.
Detroit Copper and Brass Rolling Mills, Larned and Fourth sts., Detroit, Mich.
DeWitt Wire Cloth Company, Belleville, New Jersey.
Hendricks Brothers, Belleville, New Jersey. New York office, 49 Cliff st. Copper wire.
Holmes, Booth & Haydens, Waterbury, Conn.
Manhattan Brass Company, New York.
Plume and Atwood Manufacturing Company, Thomaston, Conn.
Rome Iron Works, Rome, N. Y.
Stainer & Laffy, Belleville, New Jersey.
Waterbury Brass Company, Waterbury, Conn.

CAR-AXLE MANUFACTURERS.

NOTE.—Some of these works make rolled axles and others make hammered axles.

MAINE—1.

Portland Forge Company, Portland.

NEW HAMPSHIRE—2.

Cole Manufacturing Company, Lake Village.

Nashua Iron and Steel Company, Nashua.

MASSACHUSETTS—3.

Boston Forge Company, Boston.

Bridgewater Iron Company, Bridgewater.

Cape Ann Forge Works, Gloucester.

RHODE ISLAND—1.

Rhode Island Locomotive Works, Providence.

CONNECTICUT—1.

Winsted Iron Company, Winsted.

NEW YORK—5.

Albany and Rensselaer Iron and Steel Company, Troy.

Childs, Henry, Buffalo.

Delaney Forge and Iron Company, Buffalo.

Sizer, W. S., Steam Forge, Buffalo.

Wood, William W., Wood's Falls.

NEW JERSEY—3.

Macpherson, Willard & Co., Bordentown.

Paterson Iron Company, Paterson.

Taylor Iron Works, Highbridge.

PENNSYLVANIA—22 COMPLETED, 1 BUILDING.

Allentown Rolling Mills, Allentown.

Atglen Axle and Iron Manufacturing Company Limited, Atglen.

Bethlehem Iron Company, Bethlehem.

Catasauqua Manufacturing Company, Catasauqua.

Cayuta Forge and Axle Company, Sayre.

Erie Forge Company, Erie.

Frankford Steel Works, Adam Tindel, Frankford, Philadelphia. Building.

Green Ridge Iron Works, A. L. Spencer, Scranton.

Jackson and Woodin Manufacturing Company, Berwick.

Lackawanna Iron and Steel Company, Scranton.
Long & Co., Pittsburgh.
McKee, Fuller & Co., Catasauqua.
Midvale Steel Company, Nicetown P. O., Philadelphia.
Milton Iron Company, Milton.
Montour Iron and Steel Company, Danville.
Old Fort Iron Mills, Brownsville.
Pencoyd Iron Works, A. & P. Roberts & Co., Philadelphia.
Penn Iron Company Limited, Lancaster.
Pennsylvania Steel Company, Steelton.
Pittsburgh Forge and Iron Company, Pittsburgh.
Standard Steel Works, Lewistown.
Ward Axle, Brake, and Coupling Company, Monongahela City.
Wilson, Walker & Co. Limited, Pittsburgh.

DELAWARE—1.

Johnson Forge Company, Wilmington.

MARYLAND—1.

Baltimore and Ohio Railroad Company, Cumberland.

VIRGINIA—3.

J. R. Johnson & Co., Richmond.
Lynchburg Iron Company, Lynchburg.
Tredegar Company, Richmond.

ALABAMA—1.

Anniston Rolling Mill, Noble Bros. & Co., Anniston.

WEST VIRGINIA—1.

Ensign Manufacturing Company, Huntington.

KENTUCKY—1.

Louisville Steam Forge Company, Louisville.

OHIO—7.

Akron Forge Company, Akron.
Cincinnati Steam Forge Company, Cincinnati.
Cleveland City Forge and Iron Company, Cleveland.
Cleveland Rolling Mill Company, Cleveland.
Lake Erie Iron Company, Cleveland.
Otis Iron and Steel Company, Cleveland.
Swift's Iron and Steel Works, Cincinnati.

INDIANA—3.

Bass Foundry and Machine Works, Fort Wayne.
Central Iron and Steel Company, Brazil.
New Albany Steam Forge, New Albany.

ILLINOIS—4.

Chicago Forge and Bolt Company, Chicago.
Pullman Palace Car Company, Pullman.
Rust & Coolidge, Chicago.
Willard Sons & Bell Company, Chicago.

MISSOURI—2.

Helmbacher Forge and Rolling Mills Company, St. Louis.
McDonald (A.) & Bro., St. Louis.

MICHIGAN—4.

Baugh Steam Forge Company, Detroit.
Detroit Bridge and Iron Works, Detroit.
Detroit Steam Forge, Detroit.
Michigan Car Company, Detroit.

WISCONSIN—1.

De Pere Steam Forge, West De Pere.

COLORADO—1.

Colorado Coal and Iron Company, South Pueblo.

UTAH TERRITORY—1.

Silver Iron Works, Wm. J. Silver, Salt Lake City.

CALIFORNIA—1.

Pacific Rolling Mill Company, San Francisco.

UNITED STATES.

Total number of car-axle works in the United States: 70 completed, 1 building.

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